DETERMINANTS OF ENDOWMENT SPENDING RATES AT INSTITUTIONS OF HIGHER EDUCATION

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Katherine Hoffman Duch

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ABSTRACT

Over the past decade, tuition increased at nearly twice the rate of inflation at colleges and universities across the country. Simultaneously, at elite colleges and universities, endowment values doubled, tripled, or even quadrupled over the same period. Harvard University's endowment was just shy of $9.1 billion at the end of the 1996 fiscal year; by 2008, it was over $36.5 billion. As a result of this trend, institutions of higher education have experienced burgeoning public criticism for "hoarding" their wealth and for failing to spend a greater percentage of their endowments. In January 2008, the United States Senate Finance Committee requested detailed endowment information from the 136 American higher education institutions with endowments greater than $500 million at the end of the fiscal year closing on June 30, 2007.

This paper examines the determinants of endowment spending rates and identifies the characteristics of colleges and universities that are associated with spending higher or lower percentages of endowment market values. The analyses include 126 colleges and universities with endowment market values greater than $500 million at the end of the fiscal year closing on June 30, 2007. The results suggest that private institutions, institutions with lower endowment market values, institutions with higher annual giving, institutions with a higher share of expenditures devoted to research, institutions with a higher tuition discount rate, and institutions with more Pell grant recipients spend a greater percentage of endowment market value. The results also suggest that spending policies affect spending rates.

BIOGRAPHICAL SKETCH

Katherine Duch was born in Buffalo on January 28, 1987 and graduated from Amherst Central High School in June 2005. Three years later, she graduated from Cornell University with a Bachelor of Science degree in Industrial and Labor Relations. During her time at Cornell, she served a two-year term as a Student-Elected Trustee on Cornell University's Board of Trustees, prompting her interest in higher education. She will enter Duke University in August 2009 to pursue a Doctor of Philosophy in Public Policy.

To Mom and Dad,
with love.

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Chapter 1: Introduction

At the end of the 2008 fiscal year, Harvard University's endowment was greater than $36.5 billion, the largest educational endowment in the world. Harvard's endowment is also representative of a trend: the richest ten percent of the 791 colleges and universities to complete the 2008 National Association of College and University Business Officers (NACUBO) Endowment Study possessed over 72 percent of the total endowment assets. Regardless of size, endowment distributions provide a crucial source of income for institutions of higher education. During the 2008 fiscal year, the average endowment distribution for the 77 institutions with endowment market values greater than one billion was $178 million, representing an average annual spending rate of 4.3 percent. The average endowment distribution for the 64 institutions with endowment market values between $500 million and one billion was $41 million, representing an average annual spending rate of 4.4 percent. Given that these institutions receive generous tax exemptions, recent public scrutiny has prompted some to argue that colleges and universities should be forced to spend a minimum of five percent from their endowments annually as required for other non-profit entities.

The following analyses attempts to explain the determinants of spending rates at the richest colleges and universities. Prior to World War II, the process of determining endowment distributions was relatively simple; colleges and universities would spend only current income from endowment funds. After endowment managers largely abandoned this practice during the 1960s, determining an appropriate spending rate from endowment funds became more complicated. Colleges and universities developed spending

policies to balance competing objectives: providing funds for the present while saving funds for the future and ensuring stable endowment distributions while maintaining the purchasing power of endowment funds. These spending policies dictate the spending rate from endowment funds.

In Chapter 2, I provide background information on endowments and spending policies: the definition of an endowment, the benefits of an endowment, the history of spending policies, the purpose of spending policies, an explanation of various spending policies, and a literature review. In Chapter 3, I consider the effect of eight variables on the spending rate, while controlling for time, over the eleven year period from 1996 to 2006. The independent variables include the endowment market value, the annual giving, the share of expenditures for research, the tuition discount rate, the Pell grant award, the average incoming SAT I score, the control of the institution, and the spending rule. In Chapter 4, I attempt to verify the results of Chapter 3 with a new source for the spending rate. I conclude and suggest areas of future research in Chapter 5.

Chapter 2: Endowments and Spending Policies

A. Types of Endowments

In 1939, the New York State Supreme Count defined an endowment as "the bestowment of money as a permanent fund, the income of which is to be used in the administration of a proposed work."[1] While endowments are often considered a single trust, three distinct types of endowment funds exist. True endowments are funds where the donors have stipulated that the principal from the endowment must be maintained in perpetuity. Therefore, institutions may only disburse income generated from the endowment principle. Term or "wasting" endowments are similar to true endowments with one distinct difference; unlike true endowments, institutions may disburse all or part of the principle at a prespecified time or at a prespecified rate. By accepting a true or term endowment, an institution agrees to follow any restrictions on investment methods, appreciation expenditures, or uses for the endowment distributions. Quasi-endowments, or funds functioning as endowment, are funds that have been set aside at the discretion of an institution's governing board to function as an endowment. An institution may disburse the principle of these funds at any time; because these funds are internally designated, the institution does not have any legal obligation to preserve the principle of these funds. Averaging the responses from 791 institutions for the 2008 endowment study, the National Association of College and University Business Officers (NACUBO) estimates that 55.5 percent of endowment assets are true endowments, 32.5 percent are quasi-endowments, and 6.6 percent are term endowments. On average, the percentage of true endowments is the smallest for the richest institutions,

[1] Cary and Bright (1969), p. 9.

while the percentage of quasi-endowments and term endowments is the greatest.[2]

B. Benefits of Endowments

Endowments serve a variety of crucial functions for higher education institutions.[3] First, an endowment provides an institution with a continuous source of revenue. Income from the endowment may be disbursed at the discretion of the university's trustees to support an institution's operating budget. Unrestricted endowment funds provide universities with the flexibility to allocate additional funding to any purpose, such as mitigating tuition increases, improving financial aid, hiring a new faculty member, or constructing a new building. Restricted endowment funds that align with an institution's priorities, such as funds for an endowed chair in economics, essentially serve the same purpose by allowing universities to reallocate general purpose funds that would have otherwise supported the economics department. Restricted endowment funds that do not align with an institution's priorities burden an institution if the income from the fund does not fully support the expense of the activity.

Second, endowments enable institutions to pursue academic priorities independent of outside influences. Similar to restricted gifts from donors, government appropriations often support specific purposes, forcing institutions to accept the priorities of others or to decline the funds entirely. Historical evidence suggests that a primary purpose of creating endowments may have been to mitigate the reliance on any one source of funding.[4]

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[2] For institutions with greater than one billion in endowment assets, 50.8 percent of endowment assets are true endowments, 34.9 percent are quasi-endowments, and 9.0 percent are term endowments; for institutions with greater than $500 million but less than one billion in endowment assets, 64.3 percent are true endowments, 24.7 percent are quasi-endowments, and 1.9 percent are term endowments.

[3] Massy (1990) presents and elaborates on these functions.

[4] Hansmann (1990), p. 29.

However, even consumer demand for certain programs, such as professional Master's degrees, may distort the priorities of a research university. A report of the National Commission on the Financing of Postsecondary Education identified the "freedom and flexibility to maintain institutional and professional integrity and to meet creatively and responsibly their educational goals" as a primary value of private postsecondary education.[5] Institutions with larger endowments are less reliant on sources of revenue that could limit this flexibility.[6] Thus, an institution could choose to support a course in the Turkish language with less concern for the demand of the course. Institutions with smaller endowments are "more likely to have to elevate economic considerations above academic ones."[7]

Third, endowments contribute to an institution's assets, bolster its balance sheet, provide immediate liquidity, and function as a reserve. While nearly all institutions have policies that govern the amount of income that may be disbursed in a given year, these policies are determined by the institution and may be amended by the university's trustees. Short-term borrowing from an endowment may be an appropriate course of action for an institution under various circumstances: a recession that increases the number of students requiring financial aid, a modification of tax laws that diminishes the amount of private donations, or a new federal administration with a lesser emphasis on postsecondary education.[8] Thus, endowments provide a reserve of funds and a source of immediate liquidity.

[5] Williamson (1975), p. 24.
[6] Granted, institutions with larger endowment may become reliant on endowment income.
[7] Massy (1990), p. 5.
[8] Hansmann (1990), p. 21.

Finally, endowments provide two distinctly different advantages for public and private institutions. At private institutions, endowments serve as a substitute for state appropriations. While operating subsidies from state governments have declined substantially over the past decade, state appropriations still support a considerable portion of the operating budget at public institutions, allowing these institutions to charge lower tuition to their students. Endowments at private institutions provide a means to mitigate this difference between public and private tuition rates. At public institutions, endowments provide a means to mitigate the difference "between an institution's financial needs and students' and taxpayer's ability to finance those needs."[9] Endowments at public institutions ensure that these institutions are less constrained by state appropriations.

C. History of Spending Policies

The first endowments originated as a source of perpetual support for religious organizations during the Middle Ages. During the fifteenth and sixteenth centuries, the beneficiaries of early endowments expanded to European universities, followed by American universities in the early years of the United States. The principal of these endowments was land; the income from these endowments was the rent derived from the land. As the value of the land escalated over time, the rent increased, protecting the value of the rent from inflation. During this time, separating principal from income was unambiguous, and determining a policy to specify the amount of spending was unnecessary; organizations and institutions maintained the land and depleted the rent each year.

[9] Massy (1990), p. XI

When institutions first began to invest in financial instruments, endowment management remained uncomplicated. As the recipients of gifts and bequests, higher education institutions assumed the role of charitable trustees and followed the appropriate trust laws. One of these laws stipulated that endowment managers reference legal lists of securities to determine permissible investments. The investment options for endowment managers remained limited until the *Harvard College v. Amory* court ruling in 1830. The ruling in this Massachusetts court case specifies a "prudent man" standard whereby endowment managers were free to "exercise the judgment and care under the circumstances then prevailing which men of prudence, discretion and intelligence exercise in the management of their own affairs . . . considering the probable income as well as the probable safety of their capital."[10] As long as they were circumspect in their investments, endowment managers were no longer obligated to adhere to court-prescribed lists of securities.

However, another charitable trust law, the fiduciary accounting principle, still limited the options of endowment managers. The law stipulated that charitable trustees treat capital gains (or appreciation) as part of the principal of an endowment, rather than as part of the income. Because institutions are required to maintain the principal of an endowment in perpetuity, colleges and universities expended only the current yield of endowment funds. As a result, endowment managers were pressured to create a portfolio of investments with high current yields to provide an annual source of revenue to subside the operating budget, even if these investments were unlikely to provide a high total return. Thus, even after

[10] Williamson (1975), p. 107.

the *Harvard College v. Amory* ruling, endowment managers had limited flexibility to maximize the total return of the endowment.

By the early twentieth century, endowment assets had shifted from entirely real estate holdings to largely fixed-income securities. Williamson (1975) attributes this substitution to the burgeoning availability of bonds and mortgages and to the increasing conservatism of endowment managers. Few institutions included equities in their endowment portfolios. However, the limitations of following the fiduciary accounting principle and of holding fixed-income portfolios became increasingly apparent during the stock market boom of the 1960s. As Williamson explains, fixed-income portfolios provided higher current yields than equity portfolios, while equity portfolios provided higher total return. By holding fixed-income portfolios, endowment managers ensured a reasonably constant (albeit modest) stream of dividends to support the institution's operating budget, yet the total return of their endowment assets was low, especially compared to the booming stock market. However, institutions that shifted from a fixed-income to an equity portfolio faced an immediate decline in revenue available to support the operating budget. To compensate for the loss in revenue, some institutions reduced budgets, exhausted reserves, expended the principal of funds functioning as endowment, or attempted to attract additional gifts. These institutions experienced rapidly increasing total returns but enjoyed few advantages from the returns as capital gains were added to the principle of the endowment. On the other hand, institutions that were not able to compensate for a loss in revenue maintained portfolios dominated by high-yield, low-growth investments and failed to benefit from the strong stock market performance entirely. Clearly, the fiduciary

accounting principal constrained the benefits of the strong stock market for higher educational endowments.

In 1969, two watershed publications encouraged institutions to revise their endowment management policies. In *The Law and the Lore of Endowment Funds*, William Cary and Craig Bright conduct an exhaustive analysis of the law and conclude that: (1) courts tend to exercise corporate principles when determining cases involving the financial administration of higher education institutions, (2) capital gains are distinctly treated as income under corporate law, and therefore, (3) capital gains on endowment funds without donor restricts may be treated as income.[11] They find no evidence to support the notion that higher education institutions should maintain capital gains as part of the principal of their endowments.

In *Managing Educational Endowments*, the Ford Foundation Advisory Committee on Endowment Management cites a weak record of endowment management at higher education institutions in the United States. According to the Committee, endowment managers erred by prioritizing the safety and income of endowments above the total return. The Committee encourages the trustees of colleges and universities to focus on maximizing long-term total return instead of short-term current yield, believing that an increase in the long-term total return of endowment funds would simultaneously allow for a greater annual contribution to the operating budget.

Three years later, the National Conference of Commissioners on Uniform State Laws introduced the Uniform Management of Institutional Funds Act (UMIFA) to specify new standards for endowment management. Section 2 of this act permits colleges and universities to expend a prudent

[11] Ford Foundation Advisory Committee on Endowment Management (1969), p. 23.

portion of appreciation. Section 6 provides a standard for prudence, modernizing the prudent man rule from the nineteenth century. Section 6, the Standard of Conduct, stipulates:

> In the administration of the powers to appropriate appreciation, to make and retain investments, and to delegate investment management of institutional funds, members of a governing board shall exercise ordinary business care and prudence under the facts and circumstances prevailing at the time of the action or decision.[12]

Over half of the fifty states adopted the act or a modification of the act.

Spurred by these publications and statutes, universities adopted two major changes: (1) investing in growth stocks, and (2) spending of capital appreciation. The adoption of the first change depended on the adoption of the second; colleges and universities could not comfortably invest in high-growth, low-yield securities without appropriating capital gains as income to offset the decline in yield. The adoption of the second change also represented the developing notion that the spending in any particular year should be appropriate to the long-term earning potential of the endowment and to the long-term demands of the institution. The Yale's Treasurer's Report for 1965-66 explains:

> [I]t is only by coincidence that [spending only current yield] will be a correct balance between the present and the future. Some institutions in their particular circumstances ought to save beyond Yield; others in theirs ought to spend something beyond Yield. . . . It is a paradox of Yale's current financial situation that the Yield of the present portfolio would balance present budgets. . ."[13]

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[12] Williamson (1975), p. 120.
[13] Williamson (1975), p. 115.

The report continues to explain that if the endowment manager focuses on improving current yield by investing in higher yield but lower growth stocks, "the future would be prejudiced," while if the manager focuses on improving total return by investing in lower yield but higher growth funds, then "service to the present is prejudiced if expenditure must be confined to Yield."[14] The limitations on endowment managers precluded the necessity to develop and obey a spending policy. This adjustment to allow the spending of capital appreciation requires that the trustees of colleges and universities develop a policy to determine a prudent portion of capital gains that may be allocated for expenditures. Thus, endowment management as we know it today began.

D. Purposes of Endowment Spending Policies

Prior to World War II, endowment managers concentrated on preserving the dollar value of endowment funds, not the purchasing power of endowment funds. The low interest rates of the 1960s and the high inflation of the 1970s prompted endowment managers to reconsider their focus, especially those who had invested large portions of their portfolios in bonds and who had witnessed the purchasing power of their endowments decline. Today, most institutions develop spending policies for endowment funds such that the distributions from the endowment fully support the activity in perpetuity, despite rising costs.[15] For example, an endowed scholarship should provide full funding to one student who attends the institution today and full funding to one student who attends the institution in twenty years, regardless of increases in tuition. A spending rule that

[14] Williamson (1975), p. 116.
[15] Massy (1990), p. 22.

achieves this goal provides an institution with the funds to fully support an activity indefinitely; a spending rule that does not achieve this goal burdens an institution with the funds to support only a continually decreasing fraction of the expense of the activity. However, a spending rule that maintains the real value of the endowment also requires the institution to reinvest a substantial proportion of appreciation.

By maintaining the real value of endowment funds, college and university trustees ensure intergenerational equity. Intergenerational equity refers to the notion that endowments should provide the same benefits and opportunities to future students as to current ones. Yale economist James Tobin presents the most articulate and the most frequently referenced argument:

> The trustees of an endowment institution are the guardians of the future against the claims of the present. Their task is to preserve equity among generations. The trustees of an endowment university like my own assume the institution to be immortal. They want to know, therefore, the rate of consumption from endowment that can be sustained indefinitely. . . . In formal terms, the trustees are supposed to have a zero rate of time preference.[16]

As the custodians of an eternal institution, the trustees should value current and future spending equally, an onerous task considering "the urgency of today's claims and the intensity with which they are pressed" by current stakeholders.[17]

[16] Tobin (1974), p. 427.
[17] Massy (1990), p. 23.

E. Spending Policies

Endowment managers struggled to develop appropriate spending policies during the 1970s. For all of its limitations, the traditional spending rule of spending only current yield provided two benefits: (1) relatively constant income for expenditure, and (2) automatic reinvestment of capital gains. First, because dividends remained stable even as the stock market varied, the traditional spending rule offered a predictable stream of income. With colleges and universities relying on endowment distributions to support operating budgets, reasonable consistency in year-to-year spending or (better yet) reasonable consistency in the growth of year-to-year spending is necessary.[18] Second, because capital gains could not be expended, the traditional rule ensured that capital gains were automatically reinvested. Without the limitations of the traditional spending rule, the risk of diminishing the purchasing power of endowment funds by overspending increased. Colleges and universities recognized the necessity of developing a spending rule to balance these two objectives – providing a stable source of revenue to the operating budget and maintaining the purchasing power of endowment funds – but determining a policy that achieved both of these objectives challenged endowment managers.

Institutions that apply a fixed spending rate to a volatile endowment market value face dramatic changes in year-to-year support to the operating budget. The endowment performance will correlate perfectly with the endowment payout; if the endowment market value declines by 10 percent, then the available funding to support the operating budget will decline by 10

[18] Williamson (1975), p. 122.

percent.[19] Most institutions, especially richer institutions and institutions that support a greater percentage of their operating budgets from their endowments, cannot accommodate this degree of uncertainty.

To provide greater stability of endowment distributions, many institutions calculate the spending rate as an average of several endowment market values. For example, an institution may adopt a spending rule such that the institution spends 5 percent of the moving 3-year average endowment market value. With a longer averaging period, the stability of endowment distributions is greater; however, the risk of divergence between the target spending rate and the actual spending rate is also greater.[20] Governing boards determine the target spending rate, but for institutions that adopt a spending rule dependent on the endowment market value, the actual spending rate varies. The actual spending rate is higher than the target spending rate in years when the endowment underperforms expectations and lower than the target spending rate in years when the endowment outperforms expectations. Consistent overspending from the target spending rate will gradually diminish the purchasing power of endowment funds. Complicating this policy further, the positive effect of one bull year or the negative effect of one bear year disproportionately affects the spending rate for the length of the averaging period; at the end of the averaging period, the spending rate abruptly decreases in the case of a bull year or increases in the case of a bear year. Averaging endowment market values helps to smooth the amount of endowment distributions, but one year of notable returns still affects the amount of distributions substantially.

[19] Williamson (1975), p. 128.
[20] Massy (1990), p. 32.

To provide maximum stability of endowment distributions, other institutions adopt spending rules that simply omit the endowment market value from the determination of endowment distributions. These institutions may decide to increase the prior year's spending by the inflation rate or by another prespecified rate. Determining an appropriate amount of endowment distributions for the first year and an appropriate rate of increase for the succeeding years is crucial to the success of this type of spending policy. Additionally, the actual spending rate from the endowment is likely to deviate from the target spending rate, and over time, these deviations may diminish the real value of endowment funds unless the governing board or endowment manager intervenes with ad hoc adjustments.

A growing number of institutions combine two or more spending rules to develop a hybrid spending policy. Yale, for example, determines current income as 80 percent of the prior year's spending and 20 percent of the target spending rate of 5.25 percent applied to the prior year's beginning endowment market value, adjusting both calculations for inflation. Columbia determines current income as 60 percent of the prior year's spending adjusted for inflation at higher education institutions and 40 percent of the target spending rate of 5 percent applied to the prior year's beginning endowment market value. Other institutions determine an appropriate spending rate each year or spend a prespecified percentage of current yields.

Finally, colleges and universities can constrain endowment distributions with ceilings and floors. An institution that adopts a spending rule of 5 percent of a moving 3-year average of market values can specify

that the current year's dollar-amount of spending will at least equal the prior year's dollar-amount of spending, protecting the nominal value of endowment distributions. An institution that adopts of spending rule of increasing spending by 5 percent each year can specify that the amount of distributions must range between 4.5 percent and 5.5 percent of a moving 3-year average of market values, protecting the long-term purchasing power of the endowment. Yale, for example, constrains their spending policy by adopting a floor of 4.5 percent and a ceiling of 6 percent of the endowment market value.

E. Literature Review

Early literature on endowment spending examines extensively the definition and classification of endowment income. Pye (1957) asks whether net income should include endowment income for non-profit institutions. Cary and Bright (1969) consider whether colleges and universities are subject to a legal obligation to classify capital gains as principle of endowment funds. In a 1974 publication of the *American Economic Review*, Nichols, Tobin, Litvack, Malkiel, Quandt, Eisner, and Black offer their perspectives on the appropriate definition of endowment income.

Current literature on endowment spending primarily focuses on the optimal spending rule to achieve intergenerational equity. Massy (1976) develops a model to guide university financial planning, and Massy, Grinold, Hopkins, and Gerson (1981) modify the model to account for the uncertainty of exogenous variables such as the endowment market value. Coiner (1990) considers the appropriate assumptions to develop a prudent policy of spending a fixed percentage of endowment market values. Woglom (2003) considers the concept of intergenerational equity as an

intertemporal consumption choice with an infinite time horizon and a low tolerance for risk. Basch (1999) considers the actual and optimal spending rates of private universities during the early 1990s; Kaufman and Woglom (2005) consider the actual and optimal spending rates of top liberal arts colleges during the late 1990s. Kaufman and Woglom (2005) also consider the effect of spending rules on spending rates. Other research, such as Tharp (1997), focuses on the appropriate allocation of assets for higher education institutions. To my knowledge, no study has examined if and how institutional characteristics are related to endowment spending rates.

Chapter 3: NACUBO Analysis

A. Data

The data for this section contain 1312 observations from 126 colleges and universities over an eleven-year period from 1996 to 2006. The selected institutions are listed in Appendix A and were among the 136 American higher education institutions with endowments greater than $500 million at the end of the fiscal year ending on June 30, 2007.[21] Sixty-four percent of the selected institutions are private. Additionally, I classify twenty percent of the institutions as "main campus" institutions, where the observations merge system data for the dependent variable (such as the University of Texas System) and institutional data for the main campus for the explanatory variables (such as the University of Texas at Austin). The frequencies of institutions and observations are further specified in Tables 3.1 and 3.2.

Table 3.1: Frequencies of Institutions

	Private	Public	Total
Single Campus	81	20	101
Main Campus	1	24	25
Total	82	44	126

Table 3.2: Frequencies of Observations

	Private	Public	Total
Single Campus	848	210	1058
Main Campus	11	243	254
Total	859	453	1312

[21] Five of the ten institutions excluded from the analysis do not contain sufficient data; three institutions are medical colleges; one is a theological seminary; and one is an outlier. See Appendix B for details.

The data for this section are assembled from five sources. The dependent variable, the annual spending rate from endowment, is gathered from the National Association of College and University Business Officers Endowment Studies (NES). Each year, the National Association of College and University Business Officers (NACUBO) conducts a voluntary study on endowment performance and management practices at higher education institutions. NACUBO calculates the spending rate by dividing the reported amount of endowment distributions by the average of the reported beginning and ending endowment market values. To collect the most accurate data, I compiled the spending rates reported in the most recent study. Because each study provides ten years of spending rate data, the data from 1999 to 2006 are from the 2008 study; the data from 1998 is from the 2007 study; the data from 1997 is from the 2006 study; and the data from 1996 is from the 2005 study.

These studies also provide the spending rules applied by each institution to calculate the spending rates. The definition of each rule is described in Table 3.3. The number of institutions applying each spending rule and the number of observations for each spending rule are reported in Table 3.4. While similar, the first (moving 3-year average) rule and the second (moving 12-quarter average) rule measure different time periods. Institutions that follow the second spending rule average adjust their spending rate calculations quarterly, whereas institutions that following the first spending rule adjust their spending rate calculations annually. A quarter with particularly poor market returns will decrease the spending rate calculations sooner for institutions that adjust their calculations quarterly, but the same quarter will decrease the spending rate calculations further into

the future for institutions that adjust their spending rate calculations annually. The spending rules are included in the model as dichotomous explanatory variables with the second (moving 12-quarter average) rule omitted.

Table 3.3: Definition of Spending Rules

Rule	Definition
Rule 1	Spend a percentage of moving 3-year average of market values
Rule 2	Spend a percentage of moving 12-quarter average of market values
Rule 3	Spend a percentage of moving average of market values other
Rule 4	Decide on an appropriate rate each year
Rule 5	Increase prior year's spending by a percentage
Rule 6	Increase prior year's spending by the inflation rate
Rule 7	Other spending rule

Table 3.4: Frequencies of Spending Rules

Rule	Number of Institutions	Number of Observations
Rule 1	23	225
Rule 2	27	283
Rule 3	19	194
Rule 4	7	77
Rule 5	9	99
Rule 6	1	11
Rule 7	40	423
Total	126	1312

The majority of the remaining explanatory variables are supplied by the Delta Project on Postsecondary Education Costs, Productivity, and Accountability, a nonprofit organization that strives to compile data and to develop analytical tools to improve college affordability. The variables collected from this source include the control of the institution, the number of full-time equivalent enrollments, the total amount of expenditures, the total amount of expenditures for research, the tuition discount rate, and the total amount of Pell grants disbursed by the institution. Two variables, the control of the institution and the tuition discount rate, are included in the analyses without any modifications. The control of the institution is a dichotomous variable indicating whether the institution is public or private. The tuition discount rate is the sum of funded and unfunded institutional grants as a proportion of the total revenue from tuition, fees, and scholarships applied to tuition and fees; in other words, the tuition discount rate is the extent to which colleges and universities "discount" their tuition (specifically their tuition revenue) by providing institutional grants to students. From the remaining variables, I calculate the share of total expenditures for research and the Pell grant award per full-time equivalent in thousands of dollars.

Two variables are assembled from each of the three remaining sources. The Council for Aid to Education's Voluntary Support of Education surveys provides the endowment market value and the total annual giving. With the number of full-time equivalent enrollments from the Delta Project, I calculate the endowment market value per full-time equivalent in hundreds of thousands of dollars and the total annual giving per full-time equivalent in hundreds of thousands of dollars. The College

Entrance Examination Board's Annual Survey of College Standard Research Complication furnishes the 25th and 75th percentile scores of the verbal and mathematics sections of the SAT I. I average the 25th and 75th percentile scores for each section, aggregate the averages, and divide by one-hundred to yield a measure of the average combined SAT I score for incoming first-year students in hundreds of points. Finally, Yahoo! Finance reports the opening value of the Standard and Poor's 500 on the first day of the calendar year and the closing value of the Standard and Poor's 500 on the last day of the calendar year. I calculate the change in value of the Standard and Poor's 500 over a calendar year. All monetary data are adjusted according to the Consumer Price Index and reported in 2006 constant dollars. Appendix C summarizes the sources and definitions of these variables.

B. Summary Statistics

The summary statistics, reported in Table 3.5, provide the number of observations, the means, the standard deviations, the minimums, the medians, and the maximums for the dependent and explanatory variables. A cursory review of these statistics reveals that all of the variables contain a wide spread of observations. The spending rate ranges from 2.3 percent at a public university in 2000 to 9.0 percent at a private university in 2000, 2001, and 2002. The span of endowment market values per full-time equivalent is especially broad with a minimum of $7,056 per full-time equivalent at the University of Maryland-College Park in 1997 and a maximum of $1,926,015 per full-time equivalent at Princeton University in 2006. Similarly, the total annual giving varies from $929 per full-time equivalent at the University of Texas at Austin in 2005 to $86,623 per full-time equivalent at the California Institute of Technology in 1999. The Pell grant award ranges from $42 per

Table 3.5: Summary Statistics

	Observations	Mean	Std Dev	Minimum	Median	Maximum
spendrate	1312	4.7	0.9066	2.3	4.6	9.0
endow	1222	2.04	2.5482	0.07	1.09	19.26
giving	921	0.10	0.0968	0.01	0.08	0.87
research_share	854	0.13	0.1074	0.00	0.12	0.52
tuition_discount	1301	0.27	0.1157	0.01	0.27	0.96
pell	1257	0.33	0.1633	0.04	0.31	1.26
SAT50	1108	12.73	1.0968	10.10	12.75	15.25
SP500	1312	0.09	0.1733	-0.23	0.14	0.31

full-time equivalent at Harvard University in 1996 to $1,265 per full-time equivalent at the University of Miami in 1997.[22] Berry College allocated 0.09 percent of total expenditures to research in 1998, while Massachusetts Institute of Technology devoted 52.3 percent of total expenditures to research in 1997. At Howard University, only 1.3 percent of scholarships and fellowships were allocated to institutional expenses in 2004; at Cooper Union, 95.6 percent of scholarships and fellowships were allocated to institutional expenses in 2002. The average SAT I score of incoming freshmen ranges from 1010 at the University of Louisville in 1999 to 1525 at the California Institute of Technology in 2002. These disparities underscore that even among the 126 institutions with the highest endowment values, the characteristics of the institutions vary radically.

C. Model

The following model is applied to the data:

$$(1) \quad S_{it} = a_0 + a_1 X_{it} + \varepsilon_i \qquad i = 1, 2, \ldots, 126$$

where S_{it} is the spending rate for institution i in year t, X_{it} are characteristics of the institution, and ε_i is a random error term. The characteristics of the institution include the spending rule, the endowment market value per full-time equivalent, the total annual giving per full-time equivalent, the share of total expenditures for research, the tuition discount rate, the Pell grant award per full-time equivalent, and the combined average of the 25th and 75th percentile SAT I scores.[23] The model includes dichotomous variables to account for missing data. For each analysis, the model is estimated twice:

[22] This value may be an error in the Delta Project's database. The second-highest observation is $995 per full-time equivalent at the University of Texas at Austin in 2004.

[23] I remove the share of expenditures for research and the spending rules in two regressions; for both modifications, the results remain the same while the adjusted R-square decreases.

first with the annual return of the Standard and Poor's 500 and second with time dichotomous variables. For every analysis, the adjusted R-squared is greater with the time variables than with the annual return of the Standard and Poor's 500. While I include the estimates for both, I focus the following discussion on the results with the time variables. All of the institutional characteristics were insignificant when I included institutional fixed effects in the model; the data lacks sufficient variation over time within institutions to identify the effects of institutional characteristics on spending rates. The model is estimated separately for public and private institutions, as well as for single campus and main campus institutions.[24] Appendix D contains a correlation matrix of the explanatory variables.

D. Empirical Results

Table 3.6 reports the results of the regressions. Columns (1) and (2) report the results of the regressions with all institutions; columns (3) and (4) report the results of the regressions with private institutions only; and columns (5) and (6) report the results of the regressions with public institutions only. From columns (1) and (2), we see that the following variables are significant: the control of the institution, the endowment market value, the total giving, the share of expenditures for research, the tuition discount rate, the Pell grant award, the first (moving 3-year average) rule, the third (moving average other) rule, the fourth (decide each year) rule, the sixth (increase by inflation) rule, and years 1998, 1999, 2000, 2001, 2003,

[24] I estimate the model separately for institutions with "high" endowments at the end of the 2008 fiscal year (institutions with endowment market values greater than the median) and for institutions with "low" endowments (institutions with endowment market values less than the median). I also estimate the model separately for institutions with "high" average first-year SAT I scores and "low" average first-year SAT I scores where "high" and "low" are defined similarly. The results for all four regressions are similar to the results presented in the following section.

Table 3.6: Results for Private and Public Institutions

	All Institutions		Private Institutions		Public Institutions	
	(1)	(2)	(3)	(4)	(5)	(6)
private	0.25974***	0.35380***				
	(0.07773)	(0.07811)				
endow	-0.10610***	-0.09970***	-0.13203***	-0.11974***	0.3520**	0.49693***
	(0.01456)	(0.01379)	(0.01685)	(0.01594)	(0.17680)	(0.17582)
giving	1.24775***	1.48872***	0.98882**	1.44311***	1.05421	0.44619
	(0.38111)	(0.36069)	(0.44046)	(0.41777)	(1.43196)	(1.39176)
research_share	1.53468***	1.10684***	1.74082***	1.45230***	-1.37334*	-1.35624*
	(0.30710)	(0.29325)	(0.37023)	(0.35001)	(0.75977)	(0.73261)
tuition_discount	0.75869***	0.63042**	1.28886***	1.17689***	-0.97850**	-1.06882**
	(0.27005)	(0.25578)	(0.33929)	(0.32375)	(0.43774)	(0.42171)
pell	0.60968***	0.36378**	0.66013**	0.27564	0.63244***	0.72420***
	(0.18893)	(0.18047)	(0.27622)	(0.26402)	(0.22770)	(0.22485)
SAT50	-0.02375	-0.04852	0.03908	-0.03443	-0.02255	-0.02380
	(0.03592)	(0.03416)	(0.04988)	(0.04752)	(0.05822)	(0.05624)
rule1	-0.20035**	-0.20813***	-0.57203***	-0.59492***	0.31449***	0.31729***
	(0.07922)	(0.07476)	(0.11453)	(0.10756)	(0.09643)	(0.09313)
rule3	-0.21262***	-0.21721***	-0.44244***	-0.40001***	0.04240	0.03618
	(0.08145)	(0.07686)	(0.10817)	(0.10195)	(0.11117)	(0.10725)
rule4	-0.36191***	-0.39786***	-0.58957***	-0.60343***	-0.08970	-0.08326
	(0.11540)	(0.10893)	(0.14986)	(0.14278)	(0.16152)	(0.15668)
rule5	0.15440	0.14359	0.00697	0.01214		
	(0.10563)	(0.09971)	(0.11852)	(0.11143)		
rule6	0.62397**	0.59354**			0.74410***	0.73456***
	(0.26999)	(0.25478)			(0.22059)	(0.21265)

*** denotes coefficient is significant at 99%, ** denotes coefficient is significant at 95%, * denotes coefficient is significant at 90%

Table 3.6 (Continued)

rule7	-0.04824	-0.05049	-0.24211***	-0.23151***	0.22341**	0.22828**
	(0.06855)	(0.06477)	(0.09131)	(0.08592)	(0.09203)	(0.08885)
SP500	0.30835**		0.24302		0.37057*	
	(0.14779)		(0.19729)		(0.19136)	
t97		-0.08214		-0.16513		-0.22927
		(0.12317)		(0.23906)		(0.15302)
t98		-0.30162**		-0.44571*		-0.36425**
		(0.13276)		(0.25321)		(0.16313)
t99		-0.37661***		-0.46889*		-0.53758***
		(0.13242)		(0.25488)		(0.16036)
t00		-0.27142**		-0.30857		-0.51741***
		(0.13350)		(0.25517)		(0.16283)
t01		-0.30389**		-0.42313		-0.39620**
		(0.13959)		(0.26184)		(0.16926)
t02		0.27027*		0.11763		0.09537
		(0.15165)		(0.25996)		(0.32912)
t03		0.62952***		0.47271*		0.39395
		(0.15587)		(0.26403)		(0.34429)
t04		0.51191***		0.47879*		0.08705
		(0.15650)		(0.26544)		(0.35195)
t05		0.09908		0.07551		-0.36899
		(0.15656)		(0.26535)		(0.35179)
t06		-0.29082*		-0.60383**		-0.46811**
		(0.16354)		(0.25000)		(0.19871)
n	1312	1312	859	859	453	453
Adj R-Square	0.1010	0.2014	0.1339	0.2370	0.1859	0.2465
Year Dummy	no	yes	no	yes	no	yes

and 2004.[25] According to these results, the spending rate for private institutions was 0.35 percentage points greater than the spending rate for public institutions over this time period, all else equal. For every additional $100,000 of endowment market value per full-time equivalent, the spending rate decreased by 0.10 percentage points; for every additional $100,000 of annual giving per full-time equivalent or for every additional $1,000 of Pell grant awards per full-time equivalent, the spending rate increased by 1.49 percentage points or 0.36 percentage points, respectively. I expected to see a negative relationship between the spending rate and the endowment market value; a richer institution could dispense the same amount of funds with a smaller spending rate as a poorer institution could dispense with a larger spending rate. I also expected to see a positive relationship between the spending rate and the Pell grant awards; an institution with a larger proportion of students from low-income families provided these students with greater institutional funding to attract and retain them. The positive relationship between the spending rate and the annual giving per full-time equivalent is contrary to my expectations, but the result is not entirely surprising. The finding suggests that gifts from donors for specific activities only funded a portion of the total expense of that activity. For example, a gift from a donor for a new science building may have only funded 60% of the cost of construction and may have not funded any portion of the operating or maintenance costs of the building. Returning to the other variables, the spending rate increased by 0.11 percentage points or 0.06 percentage points, respectively, when the share of expenditures for research

[25] These variables are significant at 95% or 99%; 2002 is also significant at 90%.

or the tuition discount rate increased by 10 percentage points. Consistent with my expectations, institutions that devoted a greater proportion of funds to research also spent more from their endowments, suggesting that institutions funded at least a portion of their research expenses from their endowments. Also consistent with my expectations, institutions that discount their tuition revenue more by providing greater institutional grant aid to students also spent more from their endowments.

Most interesting, the spending rules applied by institutions affected the spending rates. As discussed in Chapter 2, spending rules are policy decisions, determined by a Board of Trustees or an Investment Committee of a Board of an institution. These rules are developed and applied to provide a consistent amount of endowment distributions to subsidize an institution's operating budget. As a result, wide fluctuations from year to year are undesirable and problematic. This analysis reveals that this policy decision significantly affected the spending rate for an institution. Institutions that spent a percentage of a moving 3-year average of market values (the first rule), spent a percentage of a moving average of market values other than 3-year or 12-quarter (the third rule), or decided on an appropriate rate each year (the fourth rule) spent between 0.20 and 0.36 percentage points *less* than institutions that spent a percentage of a moving 12-quarter average of market values (the second rule, omitted from the regression). Meanwhile, institutions that increased the prior year's spending by the inflation rate (the sixth rule) spent 0.62 percentage points *more* than institutions that applied the second rule to determine their spending rate. Over this period, institutions minimized their spending rate from the endowment by determining an appropriate rate each year (the fourth rule)

and maximized their spending rate from the endowment by increasing their prior year's spending by the inflation rate (the sixth rule). Finally, we see that institutions spent between 0.27 and 0.37 percentage points less during each year from 1998 to 2001 than during 1996 and that institutions spent between 0.51 and 0.63 percentage points more during 2003 and 2004.

Columns (3) and (4) report the results of the regressions with the private institutions only, and columns (5) and (6) report the results of the regressions with the public institutions only. For the private institutions, the results for the endowment market value, the annual giving, and the share of expenditures for research remain approximately unchanged from the results of the regressions with all institutions. For the public institutions, the results for the annual giving and the share of expenditures for research are not significant, and the sign on the coefficients for the endowment market value reverses. Thus, the spending rate was 0.50 percentage points greater for public institutions with $100,000 more endowment market value per full-time equivalent. One possible explanation for this result is that public institutions with smaller endowments focused on accumulating their endowments and therefore restricted their spending from endowment funds. For private institutions, the coefficient on tuition discount increases to 1.18, while for public institutions, the coefficient on tuition discount decreases to -1.07. Because the calculation of institutional grant aid included both funded and unfunded aid, these results suggest that institutional grant aid is primarily funded at public institutions, whereas institutional grant aid is primarily unfunded at private institutions. Funded institutional grants include grants for scholarships and fellowships funded by private sources such as businesses, foundations, individuals, and foreign governments;

unfunded institutional grants include all scholarships and fellowships funded by the institution such as athletic scholarships and the matching portion of federal, state, and local grants. If an institution receives funded institutional grants, the spending rate should decrease relative to an institution with the same tuition discount rate that disburses unfunded institutional grants; if an institution disburses unfunded institutional grants, the spending rate should increase relative to an institution with the same tuition discount rate that receives funded institutional grants. The result for private institutions is consistent with my expectations; as colleges and universities increased their institutional grant aid as a proportion of total tuition revenue by 10 percentage points, the spending rate increased by 0.118 percentage points. However, the result for public institutions may reflect the fact that public institutions received more funded institutional grant aid than private institutions. The coefficient of Pell grant awards is not significant for private institutions but significant at 99% for public institutions; for public institutions with an additional $1,000 in Pell grant awards per full-time equivalent, the spending rate was 0.72 percentage points greater.

The effects of the spending rules vary between public and private institutions. For private institutions, the first (moving 3-year average), the third (moving average other), the fourth (decide each year), and the seventh (other) rules are significant; for public institutions, the first (moving 3-year average), the sixth (increase by inflation), and the seventh (other) are significant. The coefficient on the first rule is negative for private institutions and positive for public institutions, indicating that spending a percentage of a moving 3-year average of market values decreased the spending rate for private institutions and increased the spending rate for

public institutions, relative to spending a percentage of a moving 12-quarter average of market values. This result may indicate that quarterly returns were better for private institutions and that annual returns were better for public institutions over the given time period. If private institutions adjusted their spending rate calculations annually, instead of quarterly, their spending rate would have decreased; if public institutions adjusted their spending rate calculations annually, instead of quarterly, their spending rate would have increased. Perhaps this result supports the generalization that private institutions with larger endowments hold riskier portfolios than public institutions with smaller endowments. Annual NES studies repeatedly report that institutions with larger endowments perform better overall than those with smaller endowments. Over the given time period, the average annual return of the Standard and Poor's 500 was 9%, and the median annual return was 14%. Given the strong returns, riskier portfolios may have provided larger short-term returns to private institutions over this period; thus, calculating the spending rate quarterly would have increased the spending rate. However, conservative portfolios may have provided larger long-term returns to public institutions over this period; thus, calculating the spending rate quarterly would have decreased the spending rate. The third (moving average other) and the fourth (decide each year) spending rules are only significant for private institutions; the sixth (increase by inflation) spending rule is only significant for public institutions; and comparing the coefficients of the seventh (other) spending rule is inconclusive given that the rule encompasses all spending rules other than the other six.

Table 3.7 reports the results of separate regressions for single campus institutions and main campus institutions. For the 25 main campus

Table 3.7: Results for Single and Main Campus Institutions

	All Institutions		Single Campus Institutions		Main Campus Institutions	
	(1)	(2)	(3)	(4)	(5)	(6)
private	0.25974***	0.35380***	0.38969***	0.46890***	1.02168***	1.30056***
	(0.07773)	(0.07811)	(0.09698)	(0.09809)	(0.26085)	(0.25580)
endow	-0.10610***	-0.09970***	-0.11697***	-0.10772***	-0.30765	-0.13610
	(0.01456)	(0.01379)	(0.01557)	(0.01474)	(0.21558)	(0.20399)
giving	1.24775***	1.48872***	1.27721***	1.61063***	-0.50825	-0.98906
	(0.38111)	(0.36069)	(0.40516)	(0.38523)	(2.00585)	(1.87457)
research_share	1.53468***	1.10684***	1.65348***	1.28050***	-2.51262**	-2.88218***
	(0.30710)	(0.29325)	(0.33073)	(0.31568)	(0.99833)	(0.92593)
tuition_discount	0.75869***	0.63042**	1.06237***	0.99481***	-0.87166	-1.22716**
	(0.27005)	(0.25578)	(0.29840)	(0.28419)	(0.64204)	(0.59478)
pell	0.60968***	0.36378**	0.59860***	0.28297	0.37727	0.65713*
	(0.18893)	(0.18047)	(0.22823)	(0.21904)	(0.36977)	(0.34643)
SAT50	-0.02375	-0.04852	-0.01516	-0.06272	0.28697***	0.32087***
	(0.03592)	(0.03416)	(0.04082)	(0.03889)	(0.10390)	(0.09683)
rule1	-0.20035**	-0.20813***	-0.28253***	-0.30895***	0.03499	-0.02904
	(0.07922)	(0.07476)	(0.09550)	(0.09046)	(0.14216)	(0.13245)
rule3	-0.21262***	-0.21721***	-0.29785***	-0.30217***	0.04075	0.00463
	(0.08145)	(0.07686)	(0.09547)	(0.09015)	(0.14149)	(0.13112)
rule4	-0.36191***	-0.39786***	-0.40042***	-0.47167***	-0.49780*	-0.63139**
	(0.11540)	(0.10893)	(0.13030)	(0.12340)	(0.28790)	(0.26711)
rule5	0.15440	0.14359	0.12388	0.11012		
	(0.10563)	(0.09971)	(0.11192)	(0.10566)		
rule6	0.62397**	0.59354**	0.69770**	0.67138**		
	(0.26999)	(0.25478)	(0.28322)	(0.26738)		

*** denotes coefficient is significant at 99%, ** denotes coefficient is significant at 95%, * denotes coefficient is significant at 90%

Table 3.7 (Continued)

rule7	-0.04824	-0.05049	-0.11840	-0.12645*	0.14945	0.12864
	(0.06855)	(0.06477)	(0.07980)	(0.07535)	(0.13134)	(0.12204)
SP500	0.30835**		0.20009		0.68646***	
	(0.14779)		(0.16955)		(0.24453)	
t97		-0.08214		-0.05483		-0.07582
		(0.12317)		(0.15206)		(0.18089)
t98		-0.30162**		-0.25192		-0.40474**
		(0.13276)		(0.16281)		(0.19548)
t99		-0.37661***		-0.29405*		-0.58237***
		(0.13242)		(0.16260)		(0.19461)
t00		-0.27142**		-0.16522		-0.59767***
		(0.13350)		(0.16390)		(0.19607)
t01		-0.30389**		-0.22151		-0.54625***
		(0.13959)		(0.17200)		(0.19923)
t02		0.27027*		0.31845*		0.28649
		(0.15165)		(0.18236)		(0.29676)
t03		0.62952***		0.64427***		0.70012**
		(0.15587)		(0.18760)		(0.31543)
t04		0.51191***		0.56748***		0.51687
		(0.15650)		(0.18673)		(0.32576)
t05		0.09908		0.20834		-0.18094
		(0.15656)		(0.18686)		(0.32464)
t06		-0.29082*		-0.54189**		-0.24088
		(0.16354)		(0.21237)		(0.22670)
n	1312	1312	1058	1058	254	254
Adj R-Square	0.1010	0.2014	0.1109	0.2085	0.3364	0.4378
Year Dummy	no	yes	no	yes	no	yes

institutions, the spending rate reported by NACUBO reflects the spending rate from an endowment supporting multiple institutions, such as the University of Texas System. However, the explanatory reported by the remaining sources reflect the characteristics of a single campus, such as the University of Texas at Austin. These observations therefore merge system data for the spending rate and institutional data for the explanatory variables. For the remaining 101 single campus institutions, these institutions have only one campus, such as Amherst College and Princeton University, or these institutions report the spending rate for a single campus within a larger system, such as the University of California-Berkeley and the University of Wisconsin-Madison.

For ease of comparison, columns (1) and (2) report the results for all institutions as in Table 3.6. Columns (3) and (4) report the results for single campus institutions. We see few substantial differences between the results for all institutions and the results for single campus institutions only; the only notable difference is that the coefficient of Pell grant awards is not significant in the results for single campus institutions only. Given that 1058 of the 1312 observations are for single campus institutions, the fact that the results are similar is not surprising. Columns (5) and (6) report the results for main campus institutions. Comparing columns (2) and (6), we see that the endowment market value, the total annual giving, the first (moving 3-year average) rule, and the third (moving average other) rule become insignificant for the main campus institutions. The coefficient for private institutions becomes much larger, but given that only one institution is both a private institution and a main campus institution, we cannot generalize this result. As in the results for public institutions in Table 3.6, the share of

expenses for research and the tuition discount rate become negative, but again, given that all but one main campus institutions are public institutions, the result is not surprising. However, the result for SAT I is significant for the first time. As the SAT I score of incoming first-year students increased by 100 points, the spending rate increased by 0.32 percentage points. Therefore, more selective main campus institutions spent a greater percentage from their endowments than less selective main campus institutions.

Table 3.8 reports the results of separate regressions for private institutions (as reported previously in Table 3.6) and for private single campus institutions. Because only one private institution is also a main campus institution, the dataset does not contain enough observations to run a regression for private main campus institutions. The results for the private single campus institutions are not substantially different for any variable than the results for all private institutions.

Similarly, Table 3.9 reports the results of separate regressions for public institutions (as reported previously in Table 3.6), for public single campus institutions, and for public main campus institutions. For public single campus institutions, the coefficient of endowment market value increases to 1.12, verifying the positive relationship between the spending rate and the endowment market value for public institutions. The coefficient of endowment market value is insignificant for public main campus institutions. Total annual giving remains insignificant; the effect of the tuition discount rate remains the same for public single campus and public main campus institutions as for all public institutions. For public main campus institutions, the coefficient of the share of expenditures for research

Table 3.8: Results for Private Single Campus Institutions

	Private Institutions		Private Institutions, Single Campus	
	(1)	(2)	(3)	(4)
endow	-0.13203***	-0.11974***	-0.13347***	-0.12159***
	(0.01685)	(0.01594)	(0.01667)	(0.01582)
giving	0.98882**	1.44311***	1.00833**	1.43502***
	(0.44046)	(0.41777)	(0.43629)	(0.41560)
research_share	1.74082***	1.45230***	1.74993***	1.47956***
	(0.37023)	(0.35001)	(0.36652)	(0.34764)
tuition_discount	1.28886***	1.17689***	1.31795***	1.21504***
	(0.33929)	(0.32375)	(0.33739)	(0.32186)
pell	0.66013**	0.27564	0.69325**	0.34113
	(0.27622)	(0.26402)	(0.28237)	(0.27230)
SAT50	0.03908	-0.03443	0.05847	-0.01303
	(0.04988)	(0.04752)	(0.04984)	(0.04776)
rule1	-0.57203***	-0.59492***	-0.51901***	-0.55140***
	(0.11453)	(0.10756)	(0.11485)	(0.10826)
rule3	-0.44244***	-0.40001***	-0.39175***	-0.36147***
	(0.10817)	(0.10195)	(0.10828)	(0.10241)
rule4	-0.58957***	-0.60343***	-0.55756***	-0.58096***
	(0.14986)	(0.14278)	(0.14901)	(0.14259)
rule5	0.00697	0.01214	0.05050	0.04806
	(0.11852)	(0.11143)	(0.11846)	(0.11162)
rule7	-0.24211***	-0.23151***	-0.19883**	-0.19664**
	(0.09131)	(0.08592)	(0.09171)	(0.08646)

*** denotes coefficient is significant at 99%, ** denotes coefficient is significant at 95%, * denotes coefficient is significant at 90%

Table 3.8 (Continued)

SP500	0.24302		0.25233	
	(0.19729)		(0.19603)	
t97		-0.16513		-0.14898
		(0.23906)		(0.23751)
t98		-0.44571*		-0.44881*
		(0.25321)		(0.25208)
t99		-0.46889*		-0.47621*
		(0.25488)		(0.25334)
t00		-0.30857		-0.31502
		(0.25517)		(0.25357)
t01		-0.42313		-0.45510*
		(0.26184)		(0.26091)
t02		0.11763		0.07837
		(0.25996)		(0.25900)
t03		0.47271*		0.41382
		(0.26403)		(0.26423)
t04		0.47879*		0.42298
		(0.26544)		(0.26451)
t05		0.07551		0.04742
		(0.26535)		(0.26477)
t06		-0.60383**		-0.69349***
		(0.25000)		(0.26773)
n	859	859	848	848
Adj R-Square	0.1339	0.2370	0.1321	0.2310
Year Dummy	no	yes	no	yes

Table 3.9: Results for Public Single and Public Main Campus Institutions

	Public Institutions		Public Institutions, Single Campus		Public Campus, Main Campus	
	(1)	(2)	(3)	(4)	(5)	(6)
endow	0.3520**	0.49693***	0.93902**	1.12301***	-0.15365	-0.06427
	(0.17680)	(0.17582)	(0.37523)	(0.38994)	(0.22200)	(0.21525)
giving	1.05421	0.44619	2.13851	1.89367	-0.08634	-0.44125
	(1.43196)	(1.39176)	(2.26490)	(2.28423)	(1.93913)	(1.85657)
research_share	-1.37334*	-1.35624*	-0.77437	-0.70577	-2.34938**	-2.40042**
	(0.75977)	(0.73261)	(1.17575)	(1.15390)	(0.98537)	(0.93340)
tuition_discount	-0.97850**	-1.06882**	-1.66649**	-1.64236***	-1.10435*	-1.36692**
	(0.43774)	(0.42171)	(0.64032)	(0.62754)	(0.62381)	(0.59267)
pell	0.63244***	0.72420***	0.41270	0.40803	0.78395**	0.93770**
	(0.22770)	(0.22485)	(0.37438)	(0.36747)	(0.38054)	(0.37191)
SAT50	-0.02255	-0.02380	-0.28233***	-0.29509***	0.29795***	0.30905***
	(0.05822)	(0.05624)	(0.08938)	(0.08760)	(0.10111)	(0.09670)
rule1	0.31449***	0.31729***	0.36002**	0.37359***	0.02897	-0.01254
	(0.09643)	(0.09313)	(0.14425)	(0.14176)	(0.13707)	(0.13198)
rule3	0.04240	0.03618	-0.40287**	-0.38800**	0.05564	0.02032
	(0.11117)	(0.10725)	(0.19242)	(0.18884)	(0.13594)	(0.12903)
rule4	-0.08970	-0.08326	-0.44096	-0.42243	-0.59028**	-0.68286**
	(0.16152)	(0.15668)	(0.28249)	(0.28007)	(0.27851)	(0.26484)
rule6	0.74410***	0.73456***	0.67172**	0.63966**		
	(0.22059)	(0.21265)	(0.26287)	(0.25661)		
rule7	0.22341**	0.22828**	-0.04536	-0.02665	0.17219	0.15039
	(0.09203)	(0.08885)	(0.14508)	(0.14162)	(0.12680)	(0.12086)

*** denotes coefficient is significant at 99%, ** denotes coefficient is significant at 95%, * denotes coefficient is significant at 90%

Table 3.9 (Continued)

SP500	0.37057*		0.01068		0.68153***	
	(0.19136)		(0.27974)		(0.23843)	
t97		-0.22927		-0.37636		-0.07730
		(0.15302)		(0.23653)		(0.18180)
t98		-0.36425**		-0.24838		-0.41051**
		(0.16313)		(0.25520)		(0.19857)
t99		-0.53758***		-0.40406		-0.61379***
		(0.16036)		(0.24977)		(0.19676)
t00		-0.51741***		-0.31428		-0.63318***
		(0.16283)		(0.25886)		(0.19773)
t01		-0.39620**		-0.04854		-0.59704***
		(0.16926)		(0.27364)		(0.20283)
t02		0.09537		0.52979		0.02122
		(0.32912)		(0.72904)		(0.35023)
t03		0.39395		0.80620		0.36447
		(0.34429)		(0.73285)		(0.37726)
t04		0.08705		0.40073		0.16091
		(0.35195)		(0.73322)		(0.39191)
t05		-0.36899		0.07436		-0.44558
		(0.35179)		(0.73282)		(0.39199)
t06		-0.46811**		-0.29813		-0.31491
		(0.19871)		(0.33622)		(0.24146)
n	453	453	210	210	243	243
Adj R-Square	0.1859	0.2465	0.2546	0.2951	0.2707	0.3531
Year Dummy	no	yes	no	yes	no	yes

is significant and negative. According to these results, as the share of expenditures for research increased by 10 percentage points, the spending rate decreased by 0.24 percentage points. This result suggests that a smaller portion of the costs of research at public main campus institutions were supported by endowment distributions than at private institutions, where the relationship between the spending rate and the share of expenditures for research is positive. The coefficient of Pell grant awards is insignificant for public single campus institutions but remains significant for public main campus institutions. Interestingly, the coefficient of SAT I is significant for both public single campus and public main campus institutions, but the effects are the reverse; at public single campus institutions, the relationship between the spending rate and SAT I score is negative, while at public main campus institutions, the relationship is positive. Thus, selectivity decreased the spending rate at public single campus institutions and increased the spending rate at public main campus institutions. While I expected that more selective institutions spent more from their endowments, I did not expect the reverse relationship for public single campus institutions.

Looking at the coefficients of the spending rules, we see that the effects of most of the spending rules either remain the same for public single campus and public main campus as for all public institutions or become insignificant. A few exceptions are rule three (moving average other), which becomes significant for public single campus institutions, and rule four (decide each year), which becomes significant for public main campus institutions. However, given the small sample sizes for each of these rules, developing any generalizations based on these results is difficult. Finally, we see that the time variables – both the annual returns of the Standard and

Poor's 500 and the time dichotomous variables – are significant for the public main campus institutions but not the public single campus institutions. This result supports our conclusions from Tables 3.6 and 3.7, where the time variables were largely significant for the public institutions only and for the main campus institutions only.

Chapter 4: Senate Finance Committee Analysis

A. Data

In January 2008, the United States Senate Finance Committee requested detailed endowment information from the 136 American higher education institutions with endowments greater than $500 million at the end of the fiscal year ending on June 30, 2007. The request, signed by Chairman Max Baucus and ranking minority member Charles Grassley, highlights the rising costs of postsecondary education and the strong endowment returns for the richest institutions. Seven of their eleven questions focus on endowment policies, including the mission of endowments, the growth of endowments, the asset allocation of endowment funds, the management of endowments, the cost of management of endowments, and the payout from endowments. They solicit information for the ten years preceding their request.

The data for this section contain 366 observations from 41 colleges and universities. The selected institutions are listed in Appendix E and are among the 42 colleges and universities to provide complete and accessible responses to the public as well as to the Senate Finance Committee.[26] For 34 of the 41 institutions, the data contain observations for the nine-year period from 1998 to 2006; of the remaining seven institutions, three provide observations for a slightly longer period and four provide observations for a slightly shorter period. Sixty-six percent of the selected institutions are private. The two to one ratio of private to public institutions in this chapter is approximately the same as the ratio of private to public institutions in the

[26] The one institution excluded from the analysis is an outlier. See Appendix F for details.

prior chapter. Additionally, I classify twenty-two percent of the institutions as main campus institutions, nearly the same percentage as in Chapter 3. The frequencies of institutions and observations are further specified in Tables 4.1 and 4.2, respectively.

Table 4.1: Frequencies of Institutions

	Private	Public	Total
Single Campus	27	5	32
Main Campus	0	9	9
Total	27	14	41

Table 4.2: Frequencies of Observations

	Private	Public	Total
Single Campus	239	45	284
Main Campus	0	82	82
Total	239	127	366

The data for this section are assembled from six sources. The sources and the definitions of the eight explanatory variables from the prior chapter remain the same, including the definitions of the spending rules. The number of institutions applying each spending rule and the number of observations for each spending rule are reported in Table 4.3. However, the dependent variable, the annual spending rate from the endowment, is calculated from the responses to the Senate Finance Committee. The Senate Finance Committee requested that institutions report the dollar amount of distributions from the endowment. From this variable and from the

endowment market values reported by the Council of Aid to Education, I calculate the spending rate as a percentage of the average of the beginning and ending endowment market value. With a new source for the dependent variable, I run the same regressions as in the prior chapter and compare the results. Additionally, I calculate the spending rate as a percentage of the beginning endowment market value and substitute these rates for the dependent variable to test the robustness of the results. While the sample size from the responses to the

Table 4.3: Frequencies of Spending Rules

Rule	Number of Institutions	Number of Observations
Rule 1	3	26
Rule 2	10	88
Rule 3	6	53
Rule 4	4	36
Rule 5	3	27
Rule 6	0	0
Rule 7	15	136
Total	41	366

Senate Finance Committee in this chapter is much smaller than the sample size from the annual NACUBO studies in the prior chapter, this part is only intended to verify the results of Chapter 3. Appendix C summarizes the sources and definitions of these variables.

B. Summary Statistics

The summary statistics, reported in Table 4.4, provide the number of observations, the means, the standard deviations, the minimums, the medians, and the maximums for the dependent and explanatory variables. Again, the variables capture a wide scope of observations. The spending rate as reported by NACUBO ranges from 2.4 percent at Pomona College in 2001 to 8.3 percent at Rensselaer Polytechnic Institute in 2005; the spending rate as calculated from the responses to the Senate Finance Committee as a percentage of the average of the beginning and ending endowment market values ranges from 1.4 percent at the University of Minnesota-Twin Cities in 2006 to 10.7 percent at the University of Michigan-Ann Arbor in 2000; the spending rate as calculated from the responses to the Senate Finance Committee as a percentage of the beginning market values ranges from 1.5 percent at the University of Minnesota-Twin Cities in 2006 to 12.8 percent at the University of Michigan-Ann Arbor in 2000. The span of endowment market values per full-time equivalent remains particularly broad with a minimum of $10,507 at the University of Texas at Austin in 1998 to a maximum of $192,602 at Princeton University in 2006. Similarly, the total annual giving spans from $929 per full-time equivalent at the University of Texas at Austin in 2005 to $59,452 per full-time equivalent at Stanford University in 2006. The Pell grant award varies from $44 per full-time equivalent at Harvard University in 2000 to $995 per full-time equivalent at the University of Texas at Austin in 2004. Grinnell College allocated 1.0 percent of expenditures to research in 2000, while Massachusetts Institute of Technology allocated 48.2 percent of expenditures to research in 1999. At the University of Iowa, only 5.2 percent of scholarships and fellowships were

Table 4.4: Summary Statistics

	Observations	Mean	Std Dev	Minimum	Median	Maximum
spendrate	356	4.5	0.7887	2.4	4.5	8.3
spendrate_ave	366	4.2	1.1060	1.4	4.2	10.7
spendrate_beg	366	4.4	1.1577	1.5	4.4	12.8
endow	363	3.12	3.6594	0.11	1.75	19.26
giving	312	0.14	0.0975	0.01	0.11	0.59
research_share	268	0.16	0.0928	0.01	0.16	0.48
tuition_discount	365	0.28	0.1115	0.05	0.27	0.60
pell	348	0.32	0.1791	0.04	0.30	1.00
SAT50	307	13.25	1.0759	10.95	13.35	15.00
SP500	366	0.06	0.1702	-0.23	0.09	0.31

allocated to the institution in 2003; at Princeton University, 60.2 percent of scholarships and fellowships were allocated to the institution in 2005. The average SAT I score of incoming freshmen ranges from 1095 at Indiana University-Bloomington in 2001 to 1500 at Massachusetts Institute of Technology in 2005. Again, even among the richest colleges and universities in the United States, wide variations exist across all variables.

C. Model

The following model is applied to the data:

$$(1) \quad S_{it} = a_0 + a_1 X_{it} + \varepsilon_i \qquad i = 1, 2, \ldots, 126$$

where S_{it} is the spending rate for institution i in year t, X_{it} are characteristics of the institution, and ε_i is a random error term. The characteristics of the institution include the spending rule, the endowment market value per full-time equivalent, the total annual giving per full-time equivalent, the share of total expenditures for research, the tuition discount rate, the Pell grant award per full-time equivalent, and the combined average of the 25th and 75th percentile SAT I scores. The model includes dichotomous variables to account for missing data. The model is estimated for three dependent variables: the spending rate reported by NACUBO, the spending rate calculated as a percentage of the average of the beginning and ending endowment market values, and the spending rate calculated as a percentage of the beginning endowment market value. The model is estimated separately for private institutions and for single campus institutions; with only fourteen public institutions and nine main campus institutions, the samples are too small to estimate the model separately for public institutions or main campus institutions. For each analysis, the model is estimated twice: first with the annual return of the Standard and Poor's 500 and second with

time dichotomous variables. Similar to Chapter 3, the adjusted R-squared is greater with the time variables than with the annual return of the Standard and Poor's 500. Appendix H contains a correlation matrix of the explanatory variables.

D. Empirical Results

Table 4.5 reports the results of the regressions for all institutions. Columns (1) and (4) report the results of regressions where the dependent variable is the spending rate reported by NACUBO; columns (2) and (5) report the results of the regressions where the dependent variable is the spending rate calculated as a percentage of the average of the beginning and ending endowment market values; and columns (3) and (6) report the results of the regressions where the dependent variable is the spending rate calculated as a percentage of the beginning endowment market value. Comparing columns (2) and (5) with columns (3) and (6) respectively, we see few notable differences between the results of the regressions with the spending rate calculated as a percentage of the average of the beginning and ending endowment market values and the results of the regressions with the spending rate calculated as a percentage of the beginning endowment market value. Additionally, the unreported results of a regression with the spending rate calculated as a percentage of the prior year's beginning endowment market value were similar. We can conclude that the calculation of spending rate has little effect on the results of the regressions. Because NACUBO calculates the spending rate as a percentage of the average of the beginning and ending endowment market values, the following discussion will focus on the differences between the spending rate as reported by NACUBO and the

Table 4.5: Results for All Institutions

	NACUBO (1)	SFC, Average (2)	SFC, Beginning (3)	NACUBO (4)	SFC, Average (5)	SFC, Beginning (6)
private	-0.09243	-0.36359*	-0.43743**	0.10497	-0.17742	-0.27713
	(0.13868)	(0.20325)	(0.21593)	(0.13190)	(0.19884)	(0.21439)
endow	-0.06248***	-0.13046***	-0.12916***	-0.06405***	-0.13703***	-0.13910***
	(0.01867)	(0.02866)	(0.03045)	(0.01683)	(0.02663)	(0.02872)
giving	0.09449	0.62300	1.00565	0.61574	1.28725	1.66475*
	(0.60518)	(0.93533)	(0.99370)	(0.54508)	(0.86995)	(0.93798)
research_share	2.65886***	0.99534	0.81639	1.99879***	0.09554	-0.02068
	(0.52447)	(0.80756)	(0.85796)	(0.47421)	(0.75241)	(0.81125)
tuition_discount	0.72459	2.39521***	2.35446***	0.31607	1.91291**	1.93410**
	(0.52739)	(0.80840)	(0.85885)	(0.47475)	(0.75090)	(0.80962)
pell	0.42781	-0.39079	-0.49376	0.22485	-0.75668*	-0.87092**
	(0.27471)	(0.41533)	(0.44124)	(0.25060)	(0.38971)	(0.42018)
SAT50	-0.22866***	0.04054	0.06748	-0.19636***	0.08059	0.08607
	(0.06443)	(0.09839)	(0.10453)	(0.05790)	(0.09115)	(0.09828)
rule1	-0.07720	-0.73771***	-0.69486**	-0.12958	-0.83964***	-0.80856***
	(0.17004)	(0.26375)	(0.28021)	(0.15249)	(0.24420)	(0.26330)
rule3	0.26712**	-0.37604**	-0.35112*	0.23474**	-0.48867***	-0.46689**
	(0.12575)	(0.18369)	(0.19516)	(0.11247)	(0.17038)	(0.18371)
rule4	-0.12062	-0.77337***	-0.76823***	-0.12774***	-0.76923***	-0.76396***
	(0.14598)	(0.22582)	(0.23992)	(0.13045)	(0.20830)	(0.22458)
rule5	0.49297***	0.19740	0.18437	0.46772***	0.14785	0.15536
	(0.16983)	(0.26280)	(0.27920)	(0.15172)	(0.24251)	(0.26147)

*** denotes coefficient is significant at 99%, ** denotes coefficient is significant at 95%, * denotes coefficient is significant at 90%

Table 4.5 (Continued)

rule7	-0.05738	-0.21440	-0.15720	-0.08638	-0.25812*	-0.20326
	(0.10105)	(0.15662)	(0.16639)	(0.09084)	(0.14535)	(0.15672)
SP500	0.58922***	0.28480	0.67655*			
	(0.21312)	(0.32566)	(0.34599)			
t97				0.15891	-0.09695	-0.10892
				(0.36493)	(0.58431)	(0.63000)
t99				0.09299	0.18427	0.08202
				(0.13880)	(0.21951)	(0.23668)
t00				0.03009	0.18596	0.34526
				(0.14021)	(0.22047)	(0.23771)
t01				0.01491	0.40291*	0.02440
				(0.14301)	(0.22660)	(0.24432)
t02				0.57138***	1.05524***	0.57881**
				(0.15018)	(0.23727)	(0.25583)
t03				1.08053***	1.61015***	1.31874***
				(0.15562)	(0.24593)	(0.26516)
t04				1.03023***	1.33706***	1.32629***
				(0.15371)	(0.24381)	(0.26288)
t05				0.66346***	1.11145***	1.07489***
				(0.15295)	(0.24272)	(0.26170)
t06				0.06499	0.86614**	0.93042**
				(0.22842)	(0.35621)	(0.38407)
n	356	366	366	356	366	366
Adj R-Square	0.2945	0.1349	0.1088	0.4389	0.2660	0.2212
Year Dummy	no	no	no	yes	yes	yes

spending rate as reported to the Senate Finance Committee, calculated the same way.

The variables that are significant for both of these spending rates include the endowment market value per student, the third (moving average other) rule, the fourth (decide each year) rule, and the time dichotomous variables. With an additional hundred-thousand dollars of endowment market value per full-time equivalent, the spending rate as reported by NACUBO decreased by 0.06 percentage points, and the spending rate as reported to the Senate Finance Committee decreased by 0.14 percentage points, all else equal. The sign on the coefficient of the third (moving average other) rule reverses; according to the spending rates reported by NACUBO, institutions that applied the third (moving average other) spending rule spent 0.23 percentage points more than institutions that applied the second (moving 12-quarter average) spending rule, whereas according to the spending rates reported to the Senate Finance Committee, institutions that applied the third (moving average other) spending rule spent 0.49 percentage points less than institutions that applied the second (moving 12-quarter average) spending rule. The sign on the coefficient of the fourth (decide each year) rule remains the same; institutions that applied the fourth (decide each year) spending rule spent less than institutions that applied the second (moving 12-quarter average) spending rule.

The variables that are significant for only one of the two spending rates are the share of expenditures for research, the tuition discount rate, the average incoming freshmen SAT I score, the first (moving 3-year average) spending rule, and the fifth (increase by percentage) spending rule. Most notably, the coefficients on the share of expenditures for research, the

average incoming freshman SAT I score, and the fifth (increase by percentage) spending rule are significant at 99% for the spending rates reported by NACUBO but insignificant for the spending rates reported to the Senate Finance Committee. On the other hand, the coefficients on the tuition discount rate and the first (moving 3-year average) spending rule are significant at 95% and 99%, respectively, for the spending rates reported to the Senate Finance Committee but insignificant for the spending rates reported to NACUBO. Thus, the results provide only limited support for the results in the prior chapter and raise concerns on the conclusions regarding the share of expenditures for research, the tuition discount rate, the average incoming freshman SAT I score, and the spending rules.

Table 4.6 reports the results of the regressions with the private institutions only. The regressions with the time dichotomous variables are excluded because the variables correlated perfectly with the dichotomous variables reflecting missing data. Again, the results for the spending rates reported by the Senate Finance Committee, either reflecting the spending rate as a percentage of the average of the beginning and ending endowment market values or the spending rate as a percentage of the beginning endowment market value, are very similar. The only notable exception is the coefficient of the Standard and Poor's 500; the coefficient is smaller and significant at 90% for the spending rate as a percentage of the average yet larger and significant at 99% for the spending rate as a percentage of the beginning endowment market value. This result reflects the fact that institutions determine endowment distributions long before the end of the fiscal year; thus, the spending rates are more closely connected to the beginning endowment market value than the average of the beginning and

Table 4.6: Results for Private Institutions

	NACUBO (1)	SFC, Average (2)	SFC, Beginning (3)
endow	-0.10190*** (0.02555)	-0.16181*** (0.02780)	-0.15906*** (0.02852)
giving	0.22732 (0.67781)	-0.45283 (0.73770)	0.12320 (0.75658)
research_share	3.23770*** (0.63035)	2.18530*** (0.68580)	2.02983*** (0.70336)
tuition_discount	1.81632*** (0.67675)	3.60867*** (0.73640)	3.51760*** (0.75524)
pell	1.00306** (0.43340)	0.68006 (0.47077)	0.53306 (0.48282)
SAT50	0.01481 (0.11782)	0.31794** (0.12826)	0.30838** (0.13155)
rule1	-0.34411 (0.20994)	-0.82378*** (0.22831)	-0.78637*** (0.23416)
rule3	0.23154 (0.17655)	-0.14480 (0.19216)	-0.12302 (0.19708)
rule4	-0.18598 (0.18293)	-0.57880*** (0.19871)	-0.56303*** (0.20379)
rule5	0.30726* (0.18238)	0.12670 (0.19849)	0.09228 (0.20357)
rule7	-0.45979*** (0.14046)	-0.58014*** (0.15288)	-0.54421*** (0.15680)

*** denotes coefficient is significant at 99%, ** denotes coefficient is significant at 95%, * denotes coefficient is significant at 90%

Table 4.6 (Continued)

SP500	0.58310** (0.25700)	0.52754* (0.27901)	0.92890*** (0.28615)
t97			
t99			
t00			
t01			
t02			
t03			
t04			
t05			
t06			
n	238	239	239
Adj R-Square	0.3386	0.3772	0.3437
Year Dummy	no	no	no

ending endowment market values. However, given the similarities between these two regressions, the following discussion focuses on the results from the regressions where the spending rate reflects a percentage of the average of the beginning and ending endowment market values.

Similar to the regressions with all institutions, the coefficients on the endowment market value per full-time equivalent are significant for the spending rates reported by NACUBO and for the spending rates reported to the Senate Finance Committee. With an additional hundred-thousand dollars of endowment market value per full-time equivalent, the spending rate as reported by NACUBO decreased by 0.10 percentage points and the spending rate as reported to the Senate Finance Committee decreased by 0.16 percentage points. Unlike the regressions with all institutions, the coefficients on the shares of expenditures for research and the tuition discount rates are significant at 99% for both spending rates. The spending rate as reported by NACUBO increased by 0.32 percentage points when an additional ten percent of expenditures were allocated to research; the spending rate as reported to the Senate Finance Committee increased by 0.22 percentage points when an additional ten percent of expenditures were allocated to research. Likewise, the spending rate as reported by NACUBO increased by 0.18 percentage points when institutions discounted their tuition revenues by 10 percentage points, and the spending rate as reported to the Senate Finance Committee increased by 0.36 percentage points when institutions discounted their tuition revenues by 10 percentage points. The coefficients on the seventh (other) spending rule are also both significant at 99% and similar in magnitude. Thus, we are reassured of the robustness of the results of these variables for private institutions. On the other hand, the

coefficient on the Pell grant award is significant at 95% for the spending rates reported by NACUBO but insignificant for the spending rates reported to the Senate Finance Committee. The coefficients on the first (moving 3-year average) rule and the fourth (decide each year) rule are significant at 99% for the spending rates reported to the Senate Finance Committee but insignificant for the spending rates reported by NACUBO. For private institutions, these results raise concerns on the conclusions of the effects of these variables on spending rates.

Finally, Table 4.7 provides the results of the regressions for single campus institutions only. These regressions exclude observations where the amount of distributions reported in the responses to the Senate Finance Committee reflects the amount of distributions from an endowment supporting multiple institutions; because the explanatory variables reflect the characteristics of a single campus, the excluded observations merge system data and institutional data. Again, the adjusted R-squared is greater for the results of the regressions with the time dichotomous variables, and again, the results for the regressions where the spending rate reflects a percentage of the average of the beginning and ending endowment market values and the results for the regressions where the spending rate reflects a percentage of the beginning endowment market values are similar.

The results for single campus institutions are similar to the results for all institutions from Table 4.5. The coefficients on endowment market value, the first (moving 3-year average) rule, and the seventh (other) rule are comparable in sign and magnitude for the spending rates as reported by NACUBO and for the spending rates as reported to the Senate Finance Committee. The coefficients on annual giving, the share of expenditures for

Table 4.7: Results for Single Campus Institutions

	NACUBO (1)	SFC, Average (2)	SFC, Beginning (3)	NACUBO (4)	SFC, Average (5)	SFC, Beginning (6)
private	0.19022	-0.70641***	-0.76026***	0.43824**	-0.49841**	-0.56619**
	(0.19037)	(0.22841)	(0.23562)	(0.17442)	(0.21951)	(0.22926)
endow	-0.08552***	-0.17758***	-0.17523***	-0.08760***	-0.18078***	-0.17820***
	(0.02182)	(0.02620)	(0.02703)	(0.01894)	(0.02384)	(0.02490)
giving	0.29035	-0.45067	0.00595	1.15411**	0.47490	0.85348
	(0.65522)	(0.78631)	(0.81113)	(0.58214)	(0.73279)	(0.76532)
research_share	3.05629***	1.51609**	1.42869**	2.34742***	0.72664	0.74674
	(0.56805)	(0.68152)	(0.70304)	(0.50061)	(0.63014)	(0.65811)
tuition_discount	1.32480**	3.95641***	3.96035***	0.94664*	3.58181***	3.55642***
	(0.59977)	(0.72034)	(0.74308)	(0.52174)	(0.65658)	(0.68572)
pell	0.20624	-0.65446	-0.76754	-0.12316	-1.04824**	-1.09472**
	(0.37900)	(0.45436)	(0.46870)	(0.33229)	(0.41814)	(0.43669)
SAT50	-0.18248**	0.21843**	0.21118**	-0.18571***	0.21655**	0.18706**
	(0.08130)	(0.09766)	(0.10074)	(0.07067)	(0.08896)	(0.09291)
rule1	-0.25385	-0.86418***	-0.81362***	-0.35017**	-0.96869***	-0.91169***
	(0.19389)	(0.23263)	(0.23998)	(0.16813)	(0.21145)	(0.22084)
rule3	0.35654**	-0.18979	-0.16153	0.30075**	-0.24307	-0.22541
	(0.14152)	(0.16995)	(0.17532)	(0.12261)	(0.15427)	(0.16112)
rule4	-0.09473	-0.43923**	-0.40581*	-0.18740	-0.52650***	-0.49586**
	(0.17619)	(0.21134)	(0.21801)	(0.15332)	(0.19252)	(0.20107)
rule5	0.44827**	0.37319*	0.34959	0.38655**	0.30860	0.30160
	(0.17378)	(0.20878)	(0.21537)	(0.15081)	(0.18981)	(0.19824)

*** denotes coefficient is significant at 99%, ** denotes coefficient is significant at 95%, * denotes coefficient is significant at 90%

Table 4.7 (Continued)

rule7	-0.30731** (0.12657)	-0.34625** (0.15205)	-0.29766* (0.15685)	-0.36284*** (0.11011)	-0.39480*** (0.13860)	-0.34614** (0.14475)
SP500	0.56376** (0.23715)	0.48694* (0.28392)	0.86980*** (0.29288)			
t97				0.02924 (0.42599)	-0.11022 (0.53620)	-0.07737 (0.56000)
t99				0.12018 (0.14982)	0.17420 (0.18859)	0.07347 (0.19696)
t00				0.03659 (0.15184)	0.00178 (0.18981)	0.15114 (0.19823)
t01				0.04698 (0.15628)	0.11028 (0.19644)	-0.26274 (0.20516)
t02				0.57445*** (0.15804)	0.72139*** (0.19879)	0.25081 (0.20761)
t03				1.07608*** (0.16691)	1.15937*** (0.20892)	0.86259*** (0.21819)
t04				1.03936*** (0.16209)	1.03932*** (0.20396)	1.02150*** (0.21301)
t05				0.73711*** (0.16094)	0.78197*** (0.20252)	0.75040*** (0.21151)
t06				-0.12326 (0.32008)	0.10534 (0.39273)	0.10819 (0.41016)
n	283	284	284	284	284	284
Adj R-Square	0.2937	0.3328	0.3020	0.4721	0.4525	0.4130
Year Dummy	no	no	no	yes	yes	yes

research, the third (moving average other) rule, and the fifth (increase by percentage) rule are all significant at 95% or 99% for the spending rates as reported by NACUBO but insignificant for the spending rates as reported to the Senate Finance Committee. The coefficients on the tuition discount rate, the Pell grant award, and the fourth (decide each year) rule are all significant at 95% or 99% for the spending rates as reported to the Senate Finance Committee but insignificant for the spending rates as reported by NACUBO. For the control of the institution and the average incoming freshman SAT I score, the coefficients are significant for both spending rates but are different signs. The spending rate was 0.44 percentage points greater at private institutions as reported by NACUBO but 0.50 percentage points less at private institutions as reported to the Senate Finance Committee. The spending rate was 0.19 percentage points less at more selective institutions as reported by NACUBO but 0.22 percentage points greater as reported to the Senate Finance Committee. These findings are inconclusive.

Chapter 5: Conclusions

Over the past decade, tuition increased at nearly twice the rate of inflation at colleges and universities across the country. Simultaneously, at elite colleges and universities, endowment values doubled, tripled, or even quadrupled over the same period. As a result, higher education institutions have experienced burgeoning public scrutiny and criticism for "hoarding" their wealth. Given these criticisms, the United States Senate Finance Committee requested detailed enrollment, financial aid, and endowment data from the 136 American colleges and universities with endowments greater than $500 million at the end of the 2007 fiscal year.

The previous chapters consider the determinants of endowment spending rates. Chapter 2 highlights the difficulty and importance of determining spending policies that achieves two contrasting objectives: providing relatively constant income for expenditure and maintaining the purchasing power of endowment funds. Chapter 3 and Chapter 4 consider the endowment spending rate at two subsets of the 136 American colleges and universities with endowments greater than $500 million as of June 30, 2007. With ordinary least squares regressions, I estimate the determinants of the spending rate reported to NACUBO in Chapter 3 and the determinants of the spending rate reported to NACUBO and to the Senate Finance Committee in Chapter 4. For each analysis, the model is estimated twice: once with the annual return of the Standard & Poor's 500 and once with time dichotomous variables.

The results of Chapter 3 yield the following conclusions. Private institutions spent 0.35 percentage points more than public institutions over this time period, all else equal. For every additional $100,000 in annual

giving per full-time equivalent, the spending rate increased by 1.49 percentage points, suggesting that gifts did not fully support the cost of the activity for which the gift was allocated. The spending rate increased by 0.11 percentage points when the share of expenditures for research increased by 10 percentage points, suggesting that research grants did not fully support the cost of the research for which the grant was earmarked. The spending rate increased by 0.06 percentage points when the tuition discount rate increased by 10 percentage points, suggesting that endowment distributions supported institutional grant aid. For every additional $1,000 in Pell grant awards per full-time equivalent, the spending rate increased by 0.36 percentage points, suggesting that Pell grant awards did not fully support the cost of educating students from low-income families relative to students from high-income families. As expected, the spending rate decreased by 0.10 percentage points for every additional $100,000 of endowment market value per full-time equivalent. The results also provide evidence that spending rules affected spending rates substantially; colleges and universities maximized their spending rate by increasing the prior year's spending by inflation and minimized their spending rate by deciding on an appropriate rate each year. These results largely remain the same for private institutions and for single campus institutions with only one or two variations: the Pell grant award becomes insignificant in both regressions and the "other" spending rule becomes significant in the regression with private institutions only. However, these results vary considerably for public institutions and for main campus institutions; for the few variables that remain significant, many of the coefficients reverse in sign.

Chapter 4 attempts to verify these results. The results are inconclusive because the effects of certain variables differ between the spending rates reported to NACUBO and the spending rates reported to the Senate Finance Committee. Such variables include the share of expenditures for research, the tuition discount rate, the average incoming freshman SAT I score, the first spending rule of spending a percentage of a moving 3-year average, and the fifth spending rule of increasing the prior year's spending by a certain percentage. The results for the Pell grant award and for the spending rule of deciding an appropriate rate each year raise concerns for private institutions and for single campus institutions; the results for the annual giving and the spending rule of spending a percentage of a moving average other than 3-year or 12-quarter raise additional concerns for single campus institutions.

B. Future Research

The results in Chapter 3 primarily reflected private institutions; over sixty-five percent of the sample consisted of private institutions. With only 44 public institutions, the results for public institutions are based on a small sample size. However, the results from Chapter 3 suggest that the effects of the variables in these analyses vary between public and private institutions. I would recommend further research with a larger sample of public institutions to verify the results of these analyses.

Additionally, the results in Chapter 4 suggest that the effects of the variables vary between the spending rates reported to NACUBO and the spending rates reported to the Senate Finance Committee, even when the spending rates are calculated identically. I have no explanation for this variation, but I would recommend further communication with NACUBO

and with the appropriate colleges and universities to identify explanations for the divergence.

Finally, the results in these analyses do not reflect the extreme declines in endowment market values during the late quarters of 2008 and the early quarters of 2009. As Williamson comments during the mid-1970s, "After two decades of relative prosperity, colleges and universities are now facing critical financial problems. . . . it is clear that the premises and policies appropriate in an era of rapid growth are inappropriate for an era of slowdown and uncertainty."[27] While his comments were based on the market declines of the early 1970s, his observations remain true after the extreme market declines of the late 2000s. Massy emphasizes the problem: "While the tension between the need to maintain or add to capital and the desire to spend for current purposes is difficult enough to manage even in normal times, the problem is exacerbated when an institution faces financial difficulties."[28] Because many payout policies are based on a moving average of market values, the stock market crash will continue to affect the endowment payout rates at colleges and universities for the next three to five years. Once the necessary data is available, future research on the topic of endowment payout rates may yield substantially different conclusions than the conclusions presented here for the period from 1996 to 2006.

[27] Williamson (1975), p. 22.
[28] Massy (1996), p. 89.

APPENDIX A

Table A1: Alphabetical List of Institutions

Institution Name	Control	Campus
Amherst College	Private	Single
Baylor University	Private	Single
Berry College	Private	Single
Boston College	Private	Single
Boston University	Private	Single
Bowdoin College	Private	Single
Brandeis University	Private	Single
Brown University	Private	Single
Bryn Mawr College	Private	Single
Bucknell University	Private	Single
California Institute of Technology	Private	Single
Carleton College	Private	Single
Carnegie Mellon University	Private	Single
Case Western Reserve University	Private	Single
Colby College	Private	Single
Colgate University	Private	Single
College of the Holy Cross	Private	Single
College of William and Mary	Public	Single
Colorado College	Private	Single
Columbia University in the City of New York	Private	Single
Cooper Union for the Advancement of Science and Art	Private	Single
Cornell University	Private	Single
Dartmouth College	Private	Single
Denison University	Private	Single
DePauw University	Private	Single
Drexel University	Private	Single
Duke University	Private	Single
Emory University	Private	Single
Florida State University	Public	Single
Furman University	Private	Single
George Washington University	Private	Single
Georgetown University	Private	Single
Georgia Institute of Technology-Main Campus	Public	Main
Grinnell College	Private	Single
Hamilton College	Private	Single
Harvard University	Private	Single
Haverford College	Private	Single
Howard University	Private	Single
Indiana University-Bloomington	Public	Main
Iowa State University	Public	Single
Lehigh University	Private	Single

Table A1 (Continued)

Institution Name	Control	Campus
Louisiana State University and Agricultural & Mechanical College	Public	Main
Macalester College	Private	Single
Massachusetts Institute of Technology	Private	Single
Michigan State University	Public	Single
Middlebury College	Private	Single
Mount Holyoke College	Private	Single
New York University	Private	Single
North Carolina State University at Raleigh	Public	Single
Northeastern University	Private	Single
Northwestern University	Private	Single
Oberlin College	Private	Single
Ohio State University-Main Campus	Public	Main
Pennsylvania State University-Main Campus	Public	Main
Pepperdine University	Private	Single
Pomona College	Private	Single
Princeton University	Private	Single
Purdue University-Main Campus	Public	Main
Rensselaer Polytechnic Institute	Private	Single
Rice University	Private	Single
Rochester Institute of Technology	Private	Single
Saint Louis University-Main Campus	Private	Main
Santa Clara University	Private	Single
Smith College	Private	Single
Southern Methodist University	Private	Single
Stanford University	Private	Single
Swarthmore College	Private	Single
Syracuse University	Private	Single
Texas A & M University	Public	Main
Texas Christian University	Private	Single
Texas Tech University	Public	Single
The University of Alabama	Public	Main
The University of Tennessee	Public	Main
The University of Texas at Austin	Public	Main
Thomas Jefferson University	Private	Single
Trinity University	Private	Single
Tufts University	Private	Single
Tulane University of Louisiana	Private	Single
University of Arizona	Public	Single
University of Arkansas Main Campus	Public	Main
University of California-Berkeley	Public	Single
University of California-Los Angeles	Public	Single
University of Chicago	Private	Single
University of Cincinnati-Main Campus	Public	Main

Table A1 (Continued)

Institution Name	Control	Campus
University of Colorado at Boulder	Public	Main
University of Delaware	Public	Single
University of Florida	Public	Single
University of Georgia	Public	Single
University of Houston	Public	Main
University of Iowa	Public	Single
University of Kansas Main Campus	Public	Main
University of Kentucky	Public	Single
University of Louisville	Public	Single
University of Maryland-College Park	Public	Main
University of Miami	Private	Single
University of Michigan-Ann Arbor	Public	Main
University of Minnesota-Twin Cities	Public	Main
University of Missouri-Columbia	Public	Main
University of Nebraska-Lincoln	Public	Main
University of North Carolina at Chapel Hill	Public	Single
University of Notre Dame	Private	Single
University of Oklahoma Norman Campus	Public	Main
University of Pennsylvania	Private	Single
University of Pittsburgh-Main Campus	Public	Main
University of Richmond	Private	Single
University of Rochester	Private	Single
University of Southern California	Private	Single
University of Tulsa	Private	Single
University of Utah	Public	Single
University of Virginia-Main Campus	Public	Main
University of Washington-Seattle Campus	Public	Main
University of Wisconsin-Madison	Public	Single
Vanderbilt University	Private	Single
Vassar College	Private	Single
Virginia Polytechnic Institute and State University	Public	Single
Wake Forest University	Private	Single
Washington and Lee University	Private	Single
Washington State University	Public	Single
Washington University in St Louis	Private	Single
Wellesley College	Private	Single
Wesleyan University	Private	Single
Williams College	Private	Single
Yale University	Private	Single
Yeshiva University	Private	Single

APPENDIX B

The original dataset for the analyses in Chapter 3 contained 131 of the 136 American colleges and universities with endowments greater than $500 million as of June 30, 2007. Four of the excluded endowments lacked associated institutional characteristics; one lacked required spending rates.[29] For the original dataset of 131 institutions, 87 were private and 106 were single campus institutions. The frequencies of institutions and observations are further specified in Tables B1 and B2, respectively.

Table B1: Number of Institutions

	Private	Public	Total
Single Campus	86	20	106
Main Campus	1	24	25
Total	87	44	131

Table B2: Number of Observations

	Private	Public	Total
Single Campus	893	210	1103
Main Campus	11	243	254
Total	904	453	1357

The summary statistics for the original dataset are reported in Table B3. The maximum values for the share of total expenditures for research and for the tuition discount rate are 230 and 1.06, respectively. Because both of these

[29] The endowments lacking institutional characteristics are for the Principia Corporation, the State University of New York (SUNY) system and the University of Buffalo, Rutgers State University of New Jersey, and Thomas Jefferson University. The one endowment lacking spending rates is for Boston College.

Table B3: Summary Statistics for Original Dataset

Variable	Observations	Mean	Std Dev	Minimum	Median	Maximum
spendrate	1357	4.7	0.9060	2.3	4.6	9.0
endow	1255	2.84	8.2664	0.07	1.15	116.95
giving	950	0.15	0.4131	0.01	0.08	5.83
research_share	887	0.53	7.9038	0.00	0.12	230.00
tuition_discount	1335	0.28	0.1366	0.01	0.27	1.06
pell	1268	0.34	0.2328	0.00	0.31	2.51
SAT50	1114	12.72	1.1010	10.10	12.75	15.25
SP500	1357	0.09	0.1731	-0.23	0.14	0.31

Table B4: Summary Statistics for Edited Dataset

Variable	Observations	Mean	Std Dev	Minimum	Median	Maximum
spendrate	1357	4.7	0.9060	2.3	4.6	9.0
endow	1255	2.84	8.2664	0.07	1.15	116.95
giving	950	0.15	0.4131	0.01	0.08	5.83
research_share	879	0.13	0.1193	0.00	0.12	0.67
tuition_discount	1324	0.28	0.1216	0.01	0.27	0.96
pell	1268	0.34	0.2328	0.00	0.31	2.51
SAT50	1114	12.72	1.1010	10.10	12.75	15.25
SP500	1357	0.09	0.1731	-0.23	0.14	0.31

variables are expressed as a proportion, these values are presumed to be errors: an institution's research expenditures cannot be greater than an institution's total expenditures, and the amount of a scholarship or fellowship allocated to the institution cannot be greater than the amount of the scholarship or fellowship itself. To adjust for these errors, I treat the share of total expenditures for research as a missing variable for the seven observations from the two institutions where the reported shares are presumed to be errors. Additionally, the six observations where the reported tuition discount rates are presumed to be errors are from the same institution; thus, I treat the tuition discount rate as a missing variable for all eleven observations from this college.

The summary statistics for the edited dataset are reported in Table B4. The maximums for the endowment market value per full-time equivalent, the total annual giving per full-time equivalent, and the Pell grant award per full-time equivalent are very large compared to the median. All ten of the ten highest observations of endowment market value per full-time equivalent are reported by Rockefeller University. Of the ten highest observations of total giving per full-time equivalent, eight observations are reported by Rockefeller University and two are reported by Baylor College of Medicine. All ten of the ten highest observations of Pell grant award per full-time equivalent are reported by Berea College. The data illustrate that Rockefeller University and Baylor College of Medicine are distinctly different from the average institution in the sample, and indeed, both of these institutions are stand-alone medical schools or medical schools unaffiliated with a comprehensive liberal arts undergraduate program. I remove all such institutions from the sample: Rockefeller University, Baylor College of

Medicine, and the Medical College of Wisconsin. I also remove another institution lacking a comprehensive liberal arts undergraduate program: Princeton Theological Seminary. Similar to medical schools, Princeton Theological seminary offers only graduate degrees from one discipline. Finally, I remove Berea College from the sample. Berea College is a private liberal arts college where all students meet a certain definition of need as determined by the Free Application for Federal Student Aid (FAFSA). Additionally, all students receive full tuition scholarships, and all students work at least ten hours per week at on campus jobs. After removing these institutions, the resulting edited and reduced dataset is described and analyzed in Chapter 3.

Columns (1) and (2) of Table B5 report the results of the regressions with the original dataset; columns (3) and (4) report the results of the regressions with the edited data; and columns (5) and (6) report the results of the regressions with the edited and reduced data.[30] The regressions with the annual return of the Standard & Poor's 500 are reported in columns (1), (3), and (5); the regressions with time dichotomous variables are reported in columns (2), (4), and (6). Comparing columns (2), (4), and (6), we see that the coefficients on the control of the institution, the endowment market value, the total annual giving, the share of expenditures for research, the tuition discount, and the Pell grant awards are greatest in absolute value for the edited and reduced dataset. The coefficient on the Pell grant awards becomes significant for the edited and reduced dataset, while the coefficient on SAT score becomes insignificant. Overall, the significance of the time

[30] The results in columns (5) and (6) are the same as the results for all institutions, first reported in columns (1) and (2) of Table 6.

Table B5: Results for Original and Edited Data

	Original Data		Edited Data		Edited and Reduced Data	
	(1)	(2)	(3)	(4)	(5)	(6)
private	0.07010	0.17282**	0.14002*	0.21992***	0.25974***	0.35380***
	(0.07284)	(0.07277)	(0.07344)	(0.07333)	(0.07773)	(0.07811)
endow	-0.02648***	-0.02847***	-0.02584***	-0.02738***	-0.10610***	-0.09970***
	(0.00721)	(0.00680)	(0.00715)	(0.00676)	(0.01456)	(0.01379)
giving	0.37114**	0.40089***	0.32628**	0.37353***	1.24775***	1.48872***
	(0.15166)	(0.14293)	(0.15128)	(0.14325)	(0.38111)	(0.36069)
research_share	0.00670*	0.00865**	1.29722***	0.92323***	1.53468***	1.10684***
	(0.00378)	(0.00358)	(0.28797)	(0.27469)	(0.30710)	(0.29325)
tuition_discount	0.30770	0.21956	0.57157**	0.44065*	0.75869***	0.63042**
	(0.24325)	(0.22984)	(0.24292)	(0.23069)	(0.27005)	(0.25578)
pell	0.12285	-0.01798	0.23052	0.00885	0.60968***	0.36378**
	(0.13671)	(0.13020)	(0.14093)	(0.13583)	(0.18893)	(0.18047)
SAT50	-0.05647*	-0.07026**	-0.08672***	-0.09274***	-0.02375	-0.04852
	(0.03234)	(0.03056)	(0.03222)	(0.03053)	(0.03592)	(0.03416)
rule1	-0.16070**	-0.17732**	-0.15911**	-0.17139**	-0.20035**	-0.20813***
	(0.08049)	(0.07586)	(0.07993)	(0.07568)	(0.07922)	(0.07476)
rule3	-0.19121**	-0.21026***	-0.18815**	-0.20464***	-0.21262***	-0.21721***
	(0.08276)	(0.07796)	(0.08209)	(0.07768)	(0.08145)	(0.07686)
rule5	-0.40229***	-0.43395***	-0.40624***	-0.43206***	-0.36191***	-0.39786***
	(0.11654)	(0.10991)	(0.11539)	(0.10927)	(0.11540)	(0.10893)
rule7	-0.00549	0.00216	0.05247	0.04617	0.15440	0.14359
	(0.10568)	(0.09962)	(0.10608)	(0.10040)	(0.10563)	(0.09971)
rule8	0.56391**	0.53719**	0.60794**	0.56151**	0.62397**	0.59354**
	(0.27588)	(0.25964)	(0.27479)	(0.25978)	(0.26999)	(0.25478)

*** denotes coefficient is significant at 99%, ** denotes coefficient is significant at 95%, * denotes coefficient is significant at 90%

Table B5 (Continued)

rule9	-0.07288	-0.08508	-0.05915	-0.07288	-0.04824	-0.05049
	(0.06889)	(0.06490)	(0.06843)	(0.06477)	(0.06855)	(0.06477)
SP500	0.33874**		0.36178**		0.30835**	
	(0.14945)		(0.14850)		(0.14779)	
t97		-0.23396*		-0.16419		-0.08214
		(0.12424)		(0.12347)		(0.12317)
t98		-0.42776***		-0.39702***		-0.30162**
		(0.13384)		(0.13334)		(0.13276)
t99		-0.51752***		-0.48732***		-0.37661***
		(0.13341)		(0.13305)		(0.13242)
t00		-0.41791***		-0.39386***		-0.27142**
		(0.13414)		(0.13387)		(0.13350)
t01		-0.44549***		-0.42635***		-0.30389**
		(0.14016)		(0.14000)		(0.13959)
t02		0.12176		0.13711		0.27027*
		(0.15124)		(0.15157)		(0.15165)
t03		0.49432***		0.50036***		0.62952***
		(0.15487)		(0.15533)		(0.15587)
t04		0.35023**		0.35884**		0.51191***
		(0.15529)		(0.15574)		(0.15650)
t05		-0.06985		-0.06431		0.09908
		(0.15507)		(0.15554)		(0.15656)
t06		-0.29993*		-0.31209**		-0.29082*
		(0.15709)		(0.15758)		(0.16354)
n	1357	1357	1357	1357	1312	1312
Adj R-Square	0.0510	0.1602	0.0621	0.1628	0.1010	0.2014
Year Dummy	no	yes	no	yes	no	yes

dichotomous variables remains the same across datasets, but the coefficients on the time variables from 1997-2001 become closer to zero for the edited and reduced dataset while the coefficients on the time variables from 2002-2005 become farther from zero.

APPENDIX C

Table C1: Sources and Definitions of Variables

Variable	Definition	Source
spendrate	Spending rate reported to NACUBO	NACUBO
private	A dummy variable for private institutions	Delta Cost Project
endow	Market value of endowment assets per full-time equivalent in hundreds of thousands of dollars	Council for Aid to Education
giving	Amount received through gifts per full-time equivalent in hundreds of thousands of dollars	Council for Aid to Education
research_share	Proportion of total expenditures allocated to research	Delta Cost Project
tuition_discount	Proportion of total tuition revenue discounted by institutional grants	Delta Cost Project
pell	Pell grant award per full-time equivalent in thousands of dollars	Delta Cost Project
SAT50	Average of 25th and 75th percentile SAT score in hundreds of points	College Board
rule1	A dummy variable for spending rule 1	NACUBO
rule3	A dummy variable for spending rule 3	NACUBO
rule4	A dummy variable for spending rule 4	NACUBO
rule5	A dummy variable for spending rule 5	NACUBO
rule6	A dummy variable for spending rule 6	NACUBO
rule7	A dummy variable for spending rule 7	NACUBO
SP500	Annual change in value of the Standard & Poor's 500	Yahoo! Finance

APPENDIX D

Table D1: Coefficient Matrix

	private	endow	giving	research	tuition	pell	SAT50	rule1	rule3	rule4	rule5	rule6	rule7
endow	0.46030	1.00000											
	<.0001												
giving	0.31915	0.57861	1.00000										
	<.0001	<.0001											
research	0.08851	0.10909	0.19123	1.00000									
	0.0013	<.0001	<.0001										
tuition	0.45690	0.45837	0.35251	0.03724	1.00000								
	<.0001	<.0001	<.0001	0.1776									
pell	-0.44411	-0.30686	-0.21267	-0.14147	-0.04441	1.00000							
	<.0001	<.0001	<.0001	<.0001	0.1079								
SAT50	0.22483	0.17249	0.09652	0.24322	0.10092	-0.15406	1.00000						
	<.0001	<.0001	0.0005	<.0001	0.0003	<.0001							
rule1	-0.15444	-0.19139	-0.07294	0.06015	-0.14588	0.08371	-0.07501	1.00000					
	<.0001	<.0001	0.0082	0.0294	<.0001	0.0024	0.0066						
rule3	0.02250	-0.10478	-0.11500	-0.03360	0.05188	0.02495	0.01851	-0.18952	1.00000				
	0.4154	.0001	<.0001	0.2239	0.0603	0.3665	0.5029	<.0001					
rule4	0.03128	0.13469	0.07321	0.03633	-0.06716	-0.03698	0.03098	-0.11360	-0.10401	1.00000			
	0.2576	<.0001	0.0080	0.1885	0.0150	0.1807	0.2621	<.0001	0.0002				
rule5	0.20746	0.27334	0.10035	-0.08531	0.15262	-0.04782	0.07782	-0.12998	-0.11901	-0.07133	1.00000		
	<.0001	<.0001	0.0003	0.0020	<.0001	0.0834	0.0048	<.0001	<.0001	0.0097			
rule6	-0.12662	-0.04987	-0.00572	-0.02087	-0.06962	-0.04470	0.01330	-0.04183	-0.03830	-0.02296	-0.02627	1.00000	
	<.0001	0.0709	0.8360	0.4501	0.0117	0.1056	0.6302	0.1299	0.1656	0.4060	0.3417		

Table D1 (Continued)

	private	endow	giving	research	tuition	pell	SAT50	rule1	rule3	rule4	rule5	rule6	rule7
rule7	0.01732	0.03989	0.05960	0.05685	-0.09709	-0.11113	0.04145	-0.31383	-0.28734	-0.17224	-0.19706	-0.06343	1.00000
	0.5307	0.1487	0.0309	0.0395	0.0004	<.0001	0.1335	<.0001	<.0001	<.0001	<.0001	0.0216	
SP500	0.01042	-0.04989	-0.18322	-0.11620	-0.04248	-0.03374	-0.08539	-0.01597	0.00290	0.00620	0.00709	0.00228	0.00796
	0.7060	0.0709	<.0001	<.0001	0.1241	0.2220	0.0020	0.5632	0.9164	0.8225	0.7974	0.9341	0.7732
t97	0.00764	-0.04475	-0.23162	-0.05048	-0.05178	-0.07347	0.06713	-0.01479	0.00453	0.00566	0.00647	0.00208	0.00711
	0.7823	0.1052	<.0001	0.0676	0.0608	0.0078	0.0150	0.5924	0.8698	0.8378	0.8148	0.9399	0.7971
t98	0.00401	-0.02418	-0.01932	-0.03147	-0.05010	-0.04901	0.07853	-0.01231	-0.00003	0.00288	0.00329	0.00106	0.00532
	0.8848	0.3815	0.4845	0.2547	0.0697	0.0760	0.0044	0.6559	0.9990	0.9171	0.9052	0.9694	0.8473
t99	-0.00315	0.00039	0.00630	-0.04449	-0.03786	0.01381	0.08453	0.00295	-0.00554	-0.00048	-0.00055	-0.00018	-0.00390
	0.9091	0.9887	0.8197	0.1072	0.1705	0.6171	0.0022	0.9150	0.8411	0.9861	0.9841	0.9949	0.8878
t00	-0.00677	0.02926	0.02453	-0.04067	-0.01964	-0.06063	0.06905	0.00174	0.00080	-0.00114	-0.00130	-0.00042	-0.00570
	0.8065	0.2895	0.3747	0.1409	0.4772	0.0281	0.0124	0.9497	0.9768	0.9672	0.9625	0.9879	0.8366
t01	-0.00292	0.01825	0.07528	-0.03657	-0.00716	-0.02383	0.07088	0.00629	-0.00138	-0.00243	-0.00278	-0.00090	-0.00367
	0.9158	0.5090	0.0064	0.1855	0.7955	0.3884	0.0102	0.8200	0.9601	0.9298	0.9197	0.9197	0.8943
t02	-0.00292	-0.00588	0.06668	0.14400	0.01939	0.05032	0.08040	0.00629	-0.00138	-0.00243	-0.00278	-0.00090	-0.00367
	0.9158	0.8315	0.0157	<.0001	0.4828	0.0685	0.0036	0.8200	0.9601	0.9298	0.9197	0.9197	0.8943
t03	-0.00292	-0.01314	0.06014	0.16666	0.03522	0.08703	0.01797	0.00629	-0.00138	-0.00243	-0.00278	-0.00090	-0.00367
	0.9158	0.6345	0.0294	<.0001	0.2023	0.0016	0.5155	0.8200	0.9601	0.9298	0.9197	0.9197	0.8943
t04	-0.00292	0.01146	0.05484	0.17797	0.04917	0.07102	0.11032	0.00629	-0.00138	-0.00243	-0.00278	-0.00090	0.00192
	0.9158	0.6783	0.0470	<.0001	0.0750	0.0101	<.0001	0.8200	0.9601	0.9298	0.9197	0.9197	0.9445
t05	-0.00292	0.03207	0.08013	0.17709	0.05367	0.05917	0.11407	0.00629	-0.00138	-0.00243	-0.00278	-0.00090	0.00192
	0.9158	0.2456	0.0037	<.0001	0.0520	0.0321	<.0001	0.8200	0.9601	0.9298	0.9197	0.9197	0.9445

Table D1 (Continued)

	private	endow	giving	research	tuition	pell	SAT50	rule1	rule3	rule4	rule5	rule6	rule7
t06	-0.00292	0.05377	0.08992	-0.24923	0.06463	0.01136	-0.73232	0.00629	-0.00138	-0.00243	-0.00278	-0.00090	0.00192
	0.9158	0.0515	0.0011	<.0001	0.0192	0.6810	<.0001	0.8200	0.9601	0.9298	0.9197	0.9197	0.9445

	SP500	t97	t98	t99	t00	t01	t02	t03	t04	t05	t06
t97	0.38756	1.00000									
	<.0001										
t98	0.31749	-0.09423	1.00000								
	<.0001	0.0006									
t99	0.19417	-0.09646	-0.09835	1.00000							
	<.0001	0.0005	0.0004								
t00	-0.35081	-0.09690	-0.09880	-0.10113	1.00000						
	<.0001	0.0004	0.0003	0.0002							
t01	-0.40790	-0.09778	-0.09969	-0.10205	-0.10252	1.00000					
	<.0001	0.0004	0.0003	0.0002	0.0002						
t02	-0.59958	-0.09778	-0.09969	-0.10205	-0.10205	-0.10345	1.00000				
	<.0001	0.0004	0.0003	0.0002	0.0002	0.0002					
t03	0.32410	-0.09778	-0.09969	-0.10205	-0.10205	-0.10345	-0.10345	1.00000			
	<.0001	0.0004	0.0003	0.0002	0.0002	0.0002	0.0002				
t04	0.00126	-0.09778	-0.09969	-0.10205	-0.10205	-0.10345	-0.10345	-0.10345	1.00000		
	0.9636	0.0004	0.0003	0.0002	0.0002	0.0002	0.0002	0.0002			
t05	-0.11001	-0.09778	-0.09969	-0.10205	-0.10205	-0.10345	-0.10345	-0.10345	-0.10345	1.00000	
	<.0001	0.0004	0.0003	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002		
t06	0.08716	-0.09778	-0.09969	-0.10205	-0.10205	-0.10345	-0.10345	-0.10345	-0.10345	-0.10345	1.00000
	0.0016	0.0004	0.0003	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	

APPENDIX E

Table E1: Alphabetical List of Institutions

Institution Name	Control	Campus
Amherst College	Private	Single
Brown University	Private	Single
Columbia University in the City of New York	Private	Single
Cornell University	Private	Single
Dartmouth College	Private	Single
Duke University	Private	Single
Georgetown University	Private	Single
Grinnell College	Private	Single
Harvard University	Private	Single
Indiana University-Bloomington	Public	Main
Iowa State University	Public	Single
Lehigh University	Private	Single
Massachusetts Institute of Technology	Private	Single
Michigan State University	Public	Single
New York University	Private	Single
Northwestern University	Private	Single
Ohio State University-Main Campus	Public	Main
Pennsylvania State University-Main Campus	Public	Main
Pomona College	Private	Single
Princeton University	Private	Single
Rensselaer Polytechnic Institute	Private	Single
Rice University	Private	Single
Smith College	Private	Single
Stanford University	Private	Single
Syracuse University	Private	Single
The University of Texas at Austin	Public	Main
Tufts University	Private	Single
University of California-Berkeley	Public	Single
University of Chicago	Private	Single
University of Iowa	Public	Single
University of Kansas Main Campus	Public	Main
University of Michigan-Ann Arbor	Public	Main
University of Minnesota-Twin Cities	Public	Main
University of Notre Dame	Private	Single
University of Pennsylvania	Private	Single
University of Rochester	Private	Single
University of Virginia-Main Campus	Public	Main
University of Washington-Seattle Campus	Public	Main
University of Wisconsin-Madison	Public	Single
Wellesley College	Private	Single
Yale University	Private	Single

APPENDIX F

The original dataset for the analyses in Chapter 4 contained all 42 of the 42 colleges and universities that provided complete and accessible responses to the public as well as to the Senate Finance Committee. For the original dataset of 42 institutions, 28 were private and 33 were single campus institutions. The frequencies of institutions and observations are further specified in Tables F1 and F2, respectively.

Table F1: Number of Institutions

	Private	Public	Total
Single Campus	28	5	33
Main Campus	0	9	9
Total	28	14	42

Table F2: Number of Observations

	Private	Public	Total
Single Campus	248	45	293
Main Campus	0	82	82
Total	248	127	375

The summary statistics for the original dataset are provided in Table F3. As in Appendix B, the maximum values for the share of total expenditures for research and the tuition discount rate exceed one. For the two observations from the one institution where the share of total expenditures for research are presumed to be errors, I report the share of total expenditures for research as missing observations. Similarly, for the

Table F3: Summary Statistics for Original Dataset

Variable	Observations	Mean	Std Dev	Minimum	Median	Maximum
spendrate	365	4.5	0.7829	2.4	4.5	8.3
spendrate_ave	375	4.2	1.0958	1.4	4.2	10.7
spendrate_beg	375	4.4	1.1459	1.5	4.4	12.8
endow	372	3.18	3.6359	0.11	1.90	19.26
giving	321	0.14	0.0963	0.01	0.11	0.59
research_share	270	0.37	2.4342	0.01	0.16	31.13
tuition_discount	374	0.30	0.1540	0.05	0.27	1.06
pell	357	0.36	0.3429	0.04	0.31	2.51
SAT50	313	13.21	1.1088	10.87	13.30	15.00
SP500	375	0.06	0.1702	-0.23	0.09	0.31

Table F4: Summary Statistics for Edited Dataset

Variable	Observations	Mean	Std Dev	Minimum	Median	Maximum
spendrate	365	4.5	0.7829	2.4	4.5	8.3
spendrate_ave	375	4.2	1.0958	1.4	4.2	10.7
spendrate_beg	375	4.4	1.1459	1.5	4.4	12.8
endow	372	3.18	3.6359	0.11	1.90	19.26
giving	321	0.14	0.0963	0.01	0.11	0.59
research_share	268	0.16	0.0928	0.01	0.16	0.48
tuition_discount	365	0.28	0.1115	0.05	0.27	0.60
pell	357	0.36	0.3429	0.04	0.31	2.51
SAT50	313	13.21	1.1088	10.87	13.30	15.00
SP500	375	0.06	0.1702	-0.23	0.09	0.31

five observations from one institution where the tuition discount rates are presumed to be errors, I treat the tuition discount rate for all observations from this institution as missing.

The summary statistics for the edited dataset are reported in Table F4. Again, the summary statistics for the Pell grant award per full-time equivalent is skewed by Berea College. Given the uniqueness of this institution as discussed in Appendix B, I remove Berea College from the analyses in this section. After removing this institution, the resulting edited and reduced dataset is described and analyzed in Chapter 4.

APPENDIX G

Table G1: Sources and Definitions of Variables

Variable	Definition	Source
spendrate	Spending rate reported to NACUBO	NACUBO
aspendrate	Calculated spending rate based on the average of beginning & ending market values	Senate Finance Committee
bspendrate	Calculated spending rate based on the beginning endowment market value	Senate Finance Committee
private	A dummy variable for private institutions	Delta Cost Project
endow	Market value of endowment assets per full-time equivalent in hundreds of thousands of dollars	Council for Aid to Education
giving	Amount received through gifts per full-time equivalent in hundreds of thousands of dollars	Council for Aid to Education
research_share	Proportion of total expenditures allocated to research	Delta Cost Project
tuition_discount	Proportion of total tuition revenue discounted by institutional grants	Delta Cost Project
pell	Pell grant award per full-time equivalent in thousands of dollars	Delta Cost Project
SAT50	Average of 25th and 75th percentile SAT score in hundreds of points	College Board
rule1	A dummy variable for spending rule 1	NACUBO
rule3	A dummy variable for spending rule 3	NACUBO
rule4	A dummy variable for spending rule 4	NACUBO
rule5	A dummy variable for spending rule 5	NACUBO
rule6	A dummy variable for spending rule 6	NACUBO
rule7	A dummy variable for spending rule 7	NACUBO
SP500	Annual change in value of the Standard & Poor's 500	Yahoo! Finance

APPENDIX H

Table H1: Coefficient Matrix

	private	endow	giving	research	tuition	pell	SAT50	rule1	rule3	rule4	rule5	rule7
endow	0.53073	1.00000										
	<.0001											
giving	0.50077	0.62112	1.00000									
	<.0001	<.0001										
research	0.26968	0.19015	0.25768	1.00000								
	0.0013	0.0002	<.0001									
tuition	0.57294	0.69767	0.49804	0.10018	1.00000							
	<.0001	<.0001	<.0001	0.0552								
pell	-0.43417	-0.35003	-0.32486	-0.25974	-0.17861	1.00000						
	<.0001	<.0001	<.0001	<.0001	0.0006							
SAT50	0.17719	0.11316	0.07029	0.39714	0.07506	-0.06098	1.00000					
	0.0006	0.0302	0.1790	<.0001	0.1513	0.2439						
rule1	0.20087	-0.03176	0.16093	0.00336	0.12888	-0.20814	0.04335	1.00000				
	0.0001	0.5442	0.0020	0.9489	0.0135	<.0001	0.4077					
rule3	-0.14111	-0.12147	-0.17811	-0.13402	-0.12329	0.06773	0.00533	-0.11344	1.00000			
	0.0068	0.0199	0.0006	0.0102	0.0181	0.1955	0.9189	0.0298				
rule4	0.06659	0.08679	0.08745	0.03674	-0.06118	0.14699	-0.01604	-0.09106	-0.13549	1.00000		
	0.2031	0.0969	0.0944	0.4829	0.2423	0.0048	0.7595	0.0815	0.0094			
rule5	0.20499	0.34288	0.18152	-0.05616	0.33849	0.07270	0.05703	-0.07781	-0.11578	-0.09294	1.00000	
	<.0001	<.0001	0.0005	0.2832	<.0001	0.1646	0.2758	0.1368	0.0266	0.0754		
rule7	0.01260	-0.00842	0.15249	0.22443	-0.11543	-0.17715	0.04609	-0.21187	-0.31524	-0.25305	-0.21622	1.00000
	0.8098	0.8724	0.0034	<.0001	0.0270	0.0007	0.3786	<.0001	<.0001	<.0001	<.0001	

Table H1 (Continued)

	private	endow	giving	research	tuition	pell	SAT50	rule1	rule3	rule4	rule5	rule7
SP500	-0.01105	-0.02394	-0.07432	-0.08053	-0.02485	0.02980	-0.15824	-0.01212	-0.00812	0.00115	0.00098	0.01631
	0.8330	0.6476	0.1553	0.1236	0.6351	0.5693	0.0024	0.8170	0.8768	0.9825	0.9851	0.7555
t97	0.00243	-0.02309	-0.10310	0.03665	-0.03536	-0.07043	0.03707	-0.02507	-0.03730	-0.02994	-0.02558	0.11832
	0.9630	0.6593	0.0484	0.4839	0.4995	0.1782	0.4790	0.6322	0.4763	0.5675	0.6252	0.0234
t98	-0.02276	-0.04455	-0.13162	-0.08363	-0.07021	-0.04960	0.10903	-0.02191	-0.00884	0.01127	0.00963	0.00541
	0.6639	0.3948	0.0116	0.1097	0.1796	0.3433	0.0368	0.6756	0.8660	0.8296	0.8541	0.9177
t99	-0.00290	-0.03923	-0.06550	-0.07481	-0.06555	-0.00074	0.11962	0.00566	0.00556	0.00224	0.00192	-0.01490
	0.9558	0.4537	0.2106	0.1526	0.2102	0.9888	0.0219	0.9139	0.9155	0.9658	0.9708	0.7761
t00	0.00342	0.00240	-0.03594	-0.05423	-0.02971	-0.10766	0.10172	0.00322	0.00194	-0.00063	-0.00054	-0.00346
	0.9480	0.9634	0.4924	0.3001	0.5704	0.0393	0.0515	0.9511	0.9704	0.9903	0.9917	0.9473
t01	0.00342	0.00952	0.05238	-0.06373	-0.00975	-0.04173	0.07983	0.00322	0.00194	-0.00063	-0.00054	-0.00346
	0.9480	0.8558	0.3170	0.2232	0.8523	0.4255	0.1269	0.9511	0.9704	0.9903	0.9917	0.9473
t02	0.00342	-0.01480	0.01735	0.14743	0.00953	0.03458	0.10622	0.00322	0.00194	-0.00063	-0.00054	-0.00346
	0.9480	0.7774	0.7405	0.0047	0.8556	0.5090	0.0420	0.9511	0.9704	0.9903	0.9917	0.9473
t03	0.00342	-0.01901	0.02737	0.16184	0.01128	0.07960	-0.01028	0.00322	0.00194	-0.00063	-0.00054	-0.00346
	0.9480	0.7167	0.6012	0.0019	0.8295	0.1280	0.8443	0.9511	0.9704	0.9903	0.9917	0.9473
t04	0.00342	0.00592	0.01572	0.17629	0.05031	0.07348	0.13953	0.00322	0.00194	-0.00063	-0.00054	-0.00346
	0.9480	0.9101	0.7641	0.0007	0.3365	0.1601	0.0074	0.9511	0.9704	0.9903	0.9917	0.9473
t05	0.00342	0.03379	0.05325	0.17246	0.04060	0.04584	0.14410	0.00322	0.00194	-0.00063	-0.00054	-0.00346
	0.9480	0.5188	0.3089	0.0009	0.4381	0.3812	0.0057	0.9511	0.9704	0.9903	0.9917	0.9473
t06	0.00342	0.07018	0.08993	-0.39660	0.06980	-0.01584	-0.79425	0.00322	0.00194	-0.00063	-0.00054	-0.00346
	0.9480	0.1798	0.0854	<.0001	0.1821	0.7624	<.0001	0.9511	0.9704	0.9903	0.9917	0.9473

Table H1 (Continued)

	SP500	t97	t98	t99	t00	t01	t02	t03	t04	t05	t06
t97	0.13530	1.00000									
	0.0095										
t98	0.41353	-0.03040	1.00000								
	<.0001	0.5616									
t99	0.28495	-0.03175	-0.11711	1.00000							
	<.0001	0.5443	0.0249								
t00	-0.33006	-0.03220	-0.11875	-0.12403	1.00000						
	<.0001	0.5387	0.0229	0.0174							
t01	-0.39064	-0.03220	-0.11875	-0.12403	-0.12577	1.00000					
	<.0001	0.5387	0.0229	0.0174	0.0159						
t02	-0.60605	-0.03220	-0.11875	-0.12403	-0.12577	-0.12577	1.00000				
	<.0001	0.5387	0.0229	0.0174	0.0159	0.0159					
t03	0.43196	-0.03220	-0.11875	-0.12403	-0.12577	-0.12577	-0.12577	1.00000			
	<.0001	0.5387	0.0229	0.0174	0.0159	0.0159	0.0159				
t04	0.06916	-0.03220	-0.11875	-0.12403	-0.12577	-0.12577	-0.12577	-0.12577	1.00000		
	0.1862	0.5387	0.0229	0.0174	0.0159	0.0159	0.0159	0.0159			
t05	-0.05587	-0.03220	-0.11875	-0.12403	-0.12577	-0.12577	-0.12577	-0.12577	-0.12577	1.00000	
	0.2857	0.5387	0.0229	0.0174	0.0159	0.0159	0.0159	0.0159	0.0159		
t06	0.16569	-0.03220	-0.11875	-0.12403	-0.12577	-0.12577	-0.12577	-0.12577	-0.12577	-0.12577	1.00000
	0.0014	0.5387	0.0229	0.0174	0.0159	0.0159	0.0159	0.0159	0.0159	0.0159	

REFERENCES

Basch, Donald L. 1999. "Changes in the Endowment Spending of Private Colleges in the Early 1990s." *The Journal of Higher Education, 70*(3), 278-308.

Cary, William L., and Craig B. Bright. 1969. *The Law and the Lore of Endowment Funds.* New York: Ford Foundation.

--. 1974. *The Developing Law of Endowment Funds: "The Law and the Lore" Revisited.* New York: Ford Foundation.

Committee on College and University Accounting and Auditing. 1973. "Endowment and Similar Funds." *Audits of Colleges and Universities.* New York: American Institute of Certified Public Accountants. 36-43.

Coiner, H. Michael. 1990. "The Lognormality of University Endowment in the Far Future and its Implications." *Economics of Education Review, 9*(2), 157-61.

Eisner, Robert, and Steven Black. 1974. Discussion. *American Economic Review, 64*(2), 438-42.

Ford Foundation Advisory Committee on Endowment Management. 1969. *Managing Educational Endowments: Report to the Ford Foundation.* New York: Ford Foundation.

Grinold, Richard C., David S. P. Hopkins, and William F. Massy. 1978. "A Model for Long-Range University Budget Planning Under Uncertainty." *The Bell Journal of Economics, 9*(2), 396-420.

Hansmann, Henry. 1990. "Why do universities have endowments?" *Journal of Legal Studies, 19*(1), 3-42.

Kaufman, Roger T. and Geoffrey Woglom. 2005. "Financial Changes and Optimal Spending Rates among Top Liberal Arts Colleges, 1996-2001." *The Review of Higher Education, 28*(3), 339-68.

--. 2005. "Modifying Endowment Spending Rules: Is it the Cure for Overspending?" *Journal of Education Finance, 31*(2), 136-71.

Litvack, James M., Burton G. Malkiel, and Richard E. Quandt. 1974. "A Plan for the Definition of Endowment Income." *American Economic Review, 64*(2), 433-37.

Massy, William F. 1976. "A Dynamic Equilibrium Model for University Budget Planning." *Management Science, 23*(3), 248-56.

--. 1990. *Endowment: Perspectives, Policies, & Management.* Washington, DC: Association of Governing Boards of Universities and Colleges.

--. 1996. "Endowment." *Resource Allocation in Higher Education.* Ann Arbor: University of Michigan Press.

Massy, William F., Richard C. Grinold, David S. P. Hopkins, and Alejandro Gerson. 1981. "Optimal Smoothing Rules for University Financial Planning." *Operations Research, 29*(6), 1121-36.

NACUBO. 2008. *NACUBO Endowment Study: Annual Report of the National Association of College and University Business Officers on Endowment Performance and Management Practices in Higher Education.* Washington, DC: National Association of College and University Business Officers.

Nichols, Donald A. 1974. "The Investment Income Formula of the American Economic Association." *American Economic Review, 64*(2), 420-26.

Pye, Malcolm. 1957. "Income Determination and the Non-Profit Institution." *The Accounting Review,* 612-21.

Tharp, Charles. 1997. "Growing the Endowment in a High-Risk Environment." *Planning for Higher Education, 25*(4), 1-8.

Tobin, James. 1974. "What is Permanent Endowment Income?" *American Economic Review, 64*(2), 427-32.

Twentieth Century Fund Task Force on College and University Endowment Policy. 1975. "Report of the Task Force." *Funds for the Future.* New York: McGraw Hill.

Williamson, J. Peter. 1975. "Background Paper." *Funds for the Future.* New York: McGraw-Hill.

Woglom, Geoffrey. 2003. "Endowment Spending Rates, Intergenerational Equity and the Sources of Capital Gains." *Economics of Education Review*, *22*(6), 591-601.